

Chapter 4 – Threats and Conservation Measures

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4 Threats and Conservation Measures

This chapter describes threats to sage-grouse and sage-grouse habitat, and provides recommended conservation measures to address those threats. The primary purpose of the information presented here is to assist Local Working Groups (LWGs) in the development or refinement of LWG sage-grouse conservation plans. Information in this chapter is presented in a hierarchical context starting at the rangewide scale, descending to the statewide scale, and then to the scale of the Sage-grouse Planning Areas (SGPA). This chapter includes background information, data, maps and selected hyperlinks as deemed appropriate. Much of this information is presented at the statewide scale. Where possible, threat data have been quantified at the SGPA scale. Over time, it is anticipated that LWGs and affiliated agencies will contribute finer resolution data that will be used in updating this information.

4.1 Rangewide threats overview

Detailed information on rangewide threats is presented in the *Conservation Assessment of Greater-Sage-grouse and Sagebrush Habitats* (Connelly et al. 2004). This assessment, along with information provided to the USFWS by other sources (e.g., state and federal agencies, non-governmental organizations, private individuals) was considered during the course of the status review and preparation of the Endangered and Threatened Wildlife and Plants: 12-Month Finding for Petitions to List the Greater Sage-grouse as Threatened or Endangered (USDI-FWS 2005, see Appendix C).

In the course of the status review, an expert panel identified the 19 most important threats to sage-grouse across its range, and assigned a relative rank to each threat within three geographical areas representing the eastern portion, western portion and entire range (USDI-FWS 2005). Overall, the panel determined that the highest ranking threats exerted their influence by habitat loss (USDI-FWS 2005).

Invasive species was ranked as the primary extinction risk factor for sage-grouse rangewide. In the western portion of the range, of which Idaho is a part, wildfire ranked second. In summary, the highest ranking rangewide threats, in order of rank, included: (1) invasive species, (2) infrastructure as related to energy development and urbanization, (3) wildfire, (4) agriculture, (5) grazing, (6) energy development, (7) urbanization, (8) strip/coal mining, (9) weather, and (10) pinyon-juniper expansion. Other threats such as disease and predation, hard-rock mining, hunting, and

contaminants were considered by the panel to be of lesser importance. Several panelists expressed concern about the synergistic aspects of threats, such as the connection between infrastructure increases and the expansion of invasive plant species (USDI-FWS 2005). The panel also predicted that the range of the greater-sage grouse would contract and fragment due to continued habitat modifications and loss (USDI-FWS 2005).

4.2 Statewide threats overview

On February 1-2, 2005, the Idaho sage-grouse science panel was convened in Boise to assist with identifying and ranking statewide threats and in estimating extirpation risk by geographic areas within Idaho. The panel consisted of six Idaho scientists (Dr. Steve Bunting, Professor, Department of Range Science, University of Idaho; Dr. Jack Connelly, Principal Wildlife Research Biologist, Idaho Department of Fish and Game; Dr. Steve Knick, U.S. Geological Survey/Biological Resources Division; Dr. Karen Launchbaugh, Chairperson, Department of Range Science, University of Idaho; Dr. Kerry Reese, Professor, Department of Fisheries and Wildlife, University of Idaho; and Dr. Mike Scott, Leader, Cooperative Fisheries and Wildlife Research Unit, University of Idaho) with acknowledged expertise in sage-grouse, rangeland, fire and landscape ecology. Appendix E provides additional details regarding the panel's composition, procedures, and findings. Results of the panel process are as follows:

Risk of extirpation of sage-grouse: Extirpation risk was evaluated for seven broad geographic areas of the state, each encompassing one or more SGPAs (see Science Panel Executive Summary, Appendix E). For consistency, the panel assumed that current management and trends/trajectories of threats, habitats and populations would continue. SGPAs with apparently higher extirpation risk (West Central, East Idaho Uplands, Curlew, East and West Magic Valley, Mountain Home) potentially have a more urgent need for conservation actions. However, proactive conservation planning and management actions in lower risk areas (Owyhee, Challis) are also important. For example, in these lower risk areas, the maintenance of ecosystem health and integrity should be priorities so that extirpation risk remains low.

Statewide threats to sage-grouse: The panel identified and ranked 19 threats to sage-grouse in Idaho (Figure 4-1). The statewide rankings are intended to serve as a tool for LWGs to consider as they identify and prioritize threats at the local SGPA level. It is important to note that the rankings reflect the collective, expert opinion of the panelists, based on a scoring process, and are not intended to imply unanimous agreement among the panelists. Because of the statewide focus, their rankings in many cases may not mirror threats or rankings at the finer scale SGPA/ LWG level.

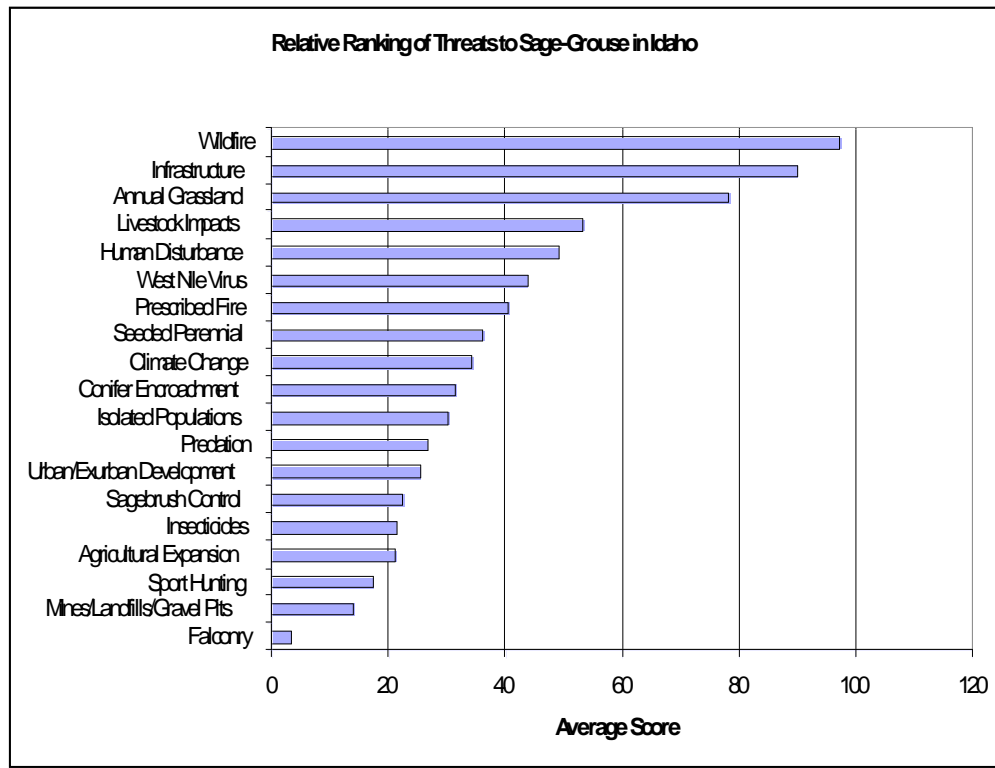


Figure 4-1 Summary ranking of threats to sage-grouse in Idaho (horizontal axis reflects an average of scores assigned by six Panelists)¹

While Figure 4-1 places the array of threats in relative context with one another, there is also a great deal of inter-relatedness between many of the threats. That is, certain threats are closely linked to other related threats and therefore influence one another (e.g., annual grasslands and wildfire; human disturbance or urban development and infrastructure; climate change and annual grasslands/conifer encroachment). It is also important to recognize that while certain threats ranked relatively high or low in a statewide context, they may be ranked differently at the local level. The panel's findings are included to help shed light on various threats to sage-grouse statewide, however, the rankings are in no way intended to preclude or supersede the identification and prioritization of threats at the SGPA/ LWG level.

¹ Idaho Sage-Grouse Science Panel. February 1 and 2, 2005, Boise, Idaho.

4.3 Specific threats and related conservation measures

In the following pages, each of the 19 threats described by the Idaho sage-grouse science panel will be discussed and conservation measures presented. Depending on the particular threat, more or less supporting data and other information will be provided. In some cases, such as wildfire and infrastructure, a considerable effort was expended acquiring and analyzing available information. For other threats, such as mines/landfills/gravel pits, and sagebrush control, little data were readily available. Conservation measures are presented in the context of the particular threat they address, and are further grouped by issues specific to each threat.

In general, healthy rangelands provide a basic foundation for productive sage-grouse habitat. Rangeland health is defined as “*the degree to which the integrity of the soil and ecological processes of rangeland ecosystems are maintained*” (National Research Council 1994). Several of the described threats negatively affect sage-grouse as well as rangeland and their impacts may be cumulative. Rangeland health is addressed indirectly within the discussion of a number of the threats (e.g., infrastructure and human disturbance) and is addressed more directly in the threat discussion of annual grasslands and livestock impacts.

The recommended conservation measures presented in this chapter are designed to eliminate, reduce, or mitigate threats to sage-grouse or to ensure the long-term sustainability of sage-grouse habitat in Idaho. LWGs are encouraged to adopt these conservation measures or others that are more locally appropriate. These conservation measures should be implemented where feasible unless documented to be inappropriate at the site or project scale. Examples of such documentation could include: description of alternative conservation measures arising from site-specific analysis, monitoring, research, or adaptive management.

4.3.1 Wildfire

4.3.1.1 Threat summary and background

Crawford et al. (2004) suggested that the management of wildfire (and prescribed fire) “is considered one of the key issues in maintaining sage-grouse populations in sagebrush-dominated landscapes.” In Idaho, wildfire poses a substantial threat to sage-grouse populations and habitat. Depending on weather, fuel conditions and other factors, wildfires potentially can quickly affect hundreds of thousands of acres of habitat in a single season. Consequently, proactive fire management and reduction of wildfire risk must continue to remain a priority.

4.3.1.2 Summary of key conservation issues

Several key issues are of primary concern. The establishment and proliferation of cheatgrass has resulted in altered fire regimes in some areas, resulting in more frequent fires and reduced habitat quantity and quality. Many wildfire ignitions are the result of a variety of human activities, and are largely preventable. Large wildfires have resulted in the reduction of significant acreages of sagebrush communities in some SGPAs, and have also hindered the recovery of sagebrush in older burns or rehabilitation areas. Finally, the rehabilitation of burned areas, while technically a management response to wildfire rather than an issue, is a crucial component of resource management on some southern Idaho rangelands, and therefore will be discussed separately.

Altered fuels and fire regimes: Historical fire-return intervals vary depending on the species and subspecies of sagebrush and site factors such as elevation and annual precipitation. See Chapter 2, Sagebrush Ecology section, for a more detailed discussion by sagebrush types. Fire regimes have changed across portions of the sagebrush biome (Connelly et al. 2004). Of particular concern in Idaho are lower elevation Wyoming big sagebrush sites, where wildfires have become much more frequent, due to the expansion of flammable, invasive annual grasses.

The proliferation of cheatgrass, an invasive annual grass species introduced in the late 1800s, has contributed to reduced fire-return intervals in parts of the Snake River Plain (Whisenant 1990). On many of these sites, fire-return intervals have been shortened to between two and four years (Whisenant 1990). Cheatgrass was reported as common on four million acres of Idaho rangelands as early as 1949 (Stewart and Hull 1949 cited in Pellant 1990). Cheatgrass and other problematic annuals such as medusahead rye (*Taeniatherum caput-medusae*) mature earlier than

native grass species, provide flammable, easily ignited fuels, and increase the likelihood of repeated fires (Young et al. 1987 cited in Pellant 1990). Many fires in south-central and western Idaho are fueled by the proliferation of the annual grasses described above.

Human-caused ignitions: Many Idaho wildfires are human-caused. Of 1,966 wildfires occurring from 1994 through 2003 on Idaho BLM lands, ignitions were determined to be 57% human-caused and 43% lightning-caused (USDI-BLM 2003). A more detailed analysis of point data from 1980 through 2003 revealed that in sage-grouse habitat on USFS and Department of Interior (BLM, BIA, USFWS, NPS) lands in Idaho, approximately 51% of ignitions were of natural origin (e.g., lightning) and the remainder were human-caused or unknown (Table 4-1).

Table 4-1 Summary of general ignition sources of fire on BLM, BIA, USFWS, NPS, and USFS lands in Idaho Sage-grouse Planning Areas, 1980-2003 (USDI-BLM 2004i)

General ignition source	Percent (and number) of ignitions within key sage-grouse habitat and potential restoration habitat²		Percent (and number) of ignitions not within³ key sage-grouse habitat or potential restoration habitat		Percent (and number) of all ignitions within SGPA perimeter	
Unknown	1	(46)	3	(25)	2	(71)
Natural e.g., lightning	51	(1,621)	48	(463)	50	(2,084)
Campfire	3	(87)	5	(44)	3	(131)
Smoking	1	(30)	3	(27)	1	(57)
Unauthorized burning ⁴	10	(307)	16	(155)	11	(462)
Incendiary	4	(140)	3	(27)	4	(167)
Equipment	9	(297)	5	(51)	8	(348)
Railroads	5	(145)	5	(51)	5	(196)
Juveniles	1	(23)	2	(16)	1	(39)
Miscellaneous ⁵	15	(478)	11	(103)	14	(581)
Total ignitions	(3,174)		(962)		(4,136)	

² Potential restoration habitat includes perennial grassland, annual grassland, and conifer encroachment areas within Sage-Grouse Planning Areas, as delineated on the 2004 Idaho Sage-Grouse Habitat Planning Map.

³ Defined as areas not classified as key sage-grouse habitat or potential restoration habitat within SGPAs, as delineated on the 2004 Idaho Sage-Grouse Habitat Planning Map.

⁴ Wildfire ignitions that result from activities such as trash burning, burning dump, field burning, land clearing, slash burning, or right-of-way burning.

⁵ Wildfire ignitions due to activities such as blasting, burning building, power line, or fireworks.

While lightning does play a substantial role in Idaho wildfire occurrences, there may be opportunity for reducing incidences of human-caused fires. Wildfire ignition sources by SGPA are shown in Table 4-2. Some SGPAs appear to be particularly troubling with respect to certain ignition sources, and many are likely preventable. For example, one-third of ignitions in the Challis SGPA and nearly one-quarter of ignitions in the East Idaho Uplands appear to have resulted from activities such as trash burning, field burning, land clearing and related practices. Railroad fires have been the source of ignitions in 14% of East Magic Valley wildfires. Use of equipment has apparently played an important role in Big Desert (12%), East Magic Valley (13%), Mountain Home (20%), and Shoshone Basin (16%) wildfire ignitions. A substantial proportion of wildfires in many SGPAs are of miscellaneous human origin. Accordingly, it may be appropriate to more aggressively target wildfire prevention, education, and enforcement efforts.

Table 4-2 Summary by Sage-grouse Planning Area of percent and number of general ignition sources within key and potential restoration habitat⁶ on BLM, BIA, USFWS, NPS and USFS lands in Idaho, 1980-2003 (USDI-BLM 2004i)

Percent (and number) of wildfire ignitions by general source																					
SGPA	Unknown		Natural (lightning)		Campfire		Smoking		Fire use ⁷		Incendiary		Equipment		Railroads		Juveniles		Misc. ⁸		Total ignitions
Big Desert	3	(4)	55	(69)	1	(1)	2	(2)	7	(9)	2	(3)	12	(15)	0	(0)	0	(0)	18	(22)	(125)
Challis	0	(0)	38	(68)	10	(18)	6	(10)	33	(60)	2	(4)	4	(8)	0	(0)	1	(2)	6	(11)	(181)
Curlew	1	(2)	74	(122)	1	(2)	0	(0)	5	(9)	4	(7)	5	(8)	0	(0)	0	(0)	9	(14)	(164)
East Idaho Uplands	1	(1)	45	(42)	1	(1)	1	(1)	23	(21)	5	(5)	6	(6)	0	(0)	2	(2)	15	(14)	(93)
East Magic Valley	1	(6)	39	(198)	1	(6)	1	(4)	10	(50)	5	(27)	13	(68)	14	(73)	0	(2)	15	(77)	(511)
Jarbridge	1	(2)	58	(177)	1	(2)	0	(0)	7	(22)	10	(30)	5	(15)	<1	(1)	<1	(1)	19	(57)	(307)
Mountain Home	0	(0)	49	(52)	3	(3)	0	(0)	7	(8)	4	(4)	20	(21)	1	(1)	1	(1)	16	(17)	(107)
Owyhee	2	(6)	57	(140)	<1	(1)	<1	(1)	7	(17)	2	(6)	7	(17)	1	(2)	<1	(1)	22	(55)	(246)
Shoshone Basin	0	(0)	49	(24)	2	(1)	2	(1)	6	(3)	0	(0)	16	(8)	0	(0)	0	(0)	24	(12)	(49)
South Magic Valley	3	(12)	72	(320)	1	(6)	<1	(1)	5	(23)	3	(13)	5	(24)	0	(0)	1	(5)	9	(40)	(444)
Upper Snake	1	(5)	46	(154)	5	(18)	2	(7)	10	(35)	3	(9)	10	(32)	6	(19)	1	(2)	16	(55)	(336)
West Central	2	(4)	62	(137)	6	(13)	1	(2)	2	(4)	2	(5)	7	(16)	4	(9)	<1	(1)	14	(30)	(221)
West Magic Valley	1	(4)	30	(118)	4	(15)	<1	(1)	12	(46)	7	(27)	15	(59)	10	(40)	2	(6)	19	(74)	(390)
Total ignitions	(46)		(1,621)		(87)		(30)		(307)		(140)		(297)		(145)		(23)		(478)		(3,174)

⁶ Inclusive of key sage-grouse habitat and potential restoration areas (perennial grassland, annual grassland, and conifer encroachment areas) as delineated on the 2004 Idaho Sage-Grouse Habitat Planning Map.

⁷ Wildfire ignitions as a result of activities such as trash burning, burning dump, field burning, land clearing, slash burning, or right-of-way burning.

⁸ Wildfire ignitions due to activities such as blasting, burning building, power line, or fireworks.

- **Reduction or modification of habitat:** Wildfires that have occurred since 1990 alone, have affected substantial acreages of sagebrush rangelands in Idaho, and pose a significant risk in some SGPAs. Spatial analysis of BLM and USFS wildfire occurrences in key habitat and potential restoration areas (perennial grasslands, annual grasslands, conifer encroachment areas) in Idaho indicate 2,155,088 “footprint acres” of wildfire between 1990 and 2003 (Table 4-3). The “footprint” concept serves to quantify actual on-the-ground habitat burned and set back to an earlier seral stage during the timeframe and does not include repeated burns of the same polygon(s). In terms of the proportion of sage-grouse habitat burned, wildfire appears to have played a relatively minor role in several SGPAs including the Challis, Owyhee, Shoshone Basin, Upper Snake, and West Central; however, fire has impacted substantial proportions of others, most notably the Big Desert, East and West Magic Valley, Jarbidge, and Curlew (Figure 4-2). In such areas, large, repeated fires provide little opportunity for sagebrush to recover to levels characteristic of breeding or winter habitat.

Table 4-3 Acres of wildfire by Sage-grouse Planning Area, 1990-2003 (USDI-BLM 2004b)

SGPA	Footprint acres of sage-grouse habitat burned⁹	Percent of sage-grouse habitat burned¹⁰
Big Desert	536,531	63
Challis	6,703	<1
Curlew	81,886	21
East Idaho Uplands	46,429	9
East Magic Valley	446,853	35
Jarbidge	346,495	29
Mountain Home	50,621	18
Owyhee	107,494	4
Shoshone Basin	6,932	4
South Magic Valley	105,960	14
Upper Snake	191,668	8
West Central	48,206	6
West Magic Valley	179,310	25
Total	2,155,088	18

⁹ Based only on wildfires within key sage-grouse habitat and potential restoration areas (perennial grassland, annual grassland, or conifer encroachment) as delineated on the 2004 Idaho Sage Grouse Habitat Planning Map (SGHPM). Not inclusive of fires in habitats unsuitable for sage-grouse (e.g., timber). Repeat-burns are not included.

¹⁰ Percent of habitat (as defined in footnote 9) burned within the SGPA. Last row in table reflects total acres of wildfire and percent of key and potential restoration habitat burned, inclusive of all SGPAs.

Wildfires in Idaho Sage-Grouse Planning Areas: 1990-2003

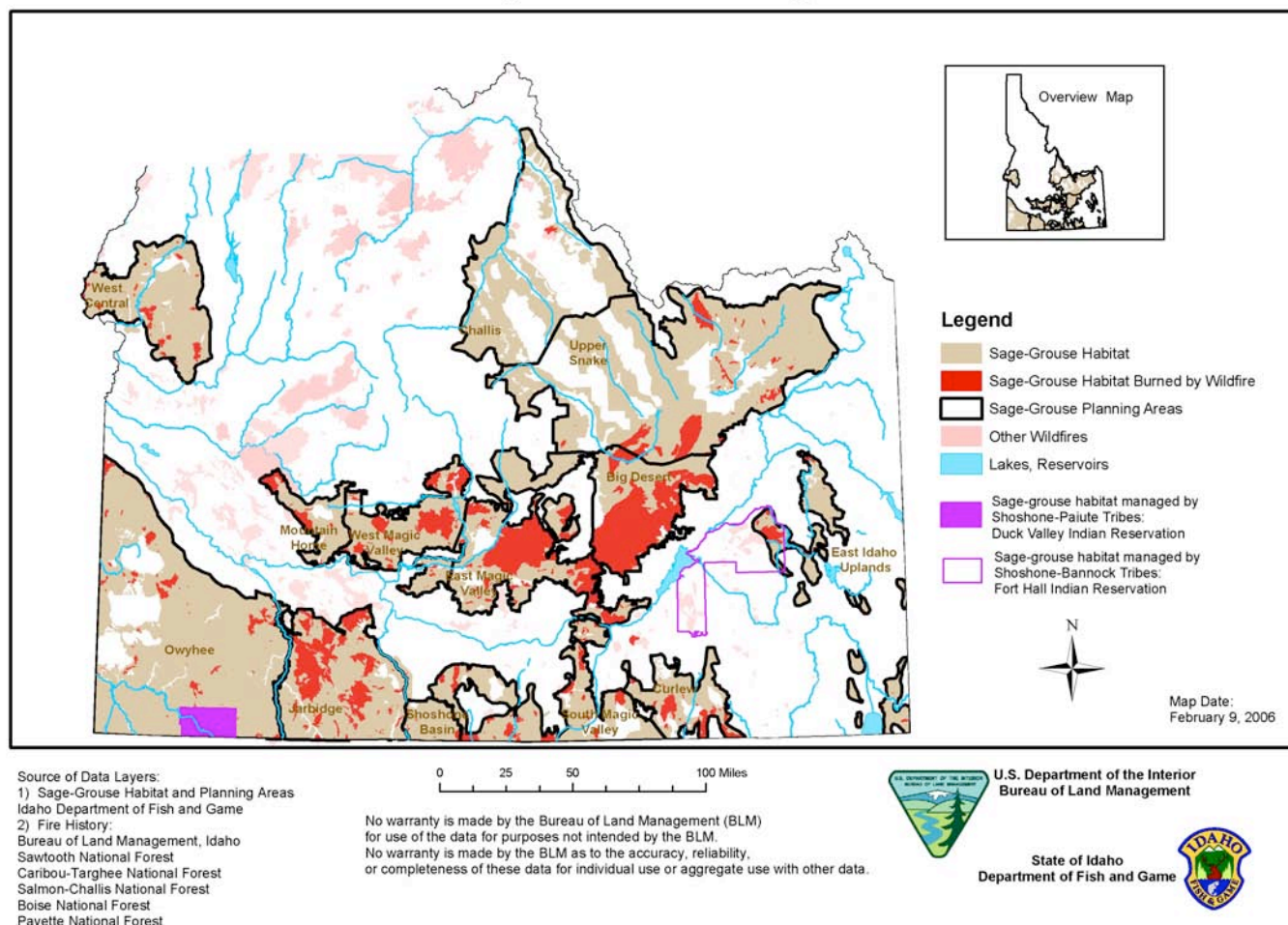


Figure 4-2 Fires burned in Idaho Sage- Grouse Planning Areas: 1990-2003¹¹

¹¹ Red areas show cumulative burned areas within key sage-grouse habitat or potential restoration areas (described as annual grasslands, perennial grasslands and conifer encroachment areas), based on the 2004 Idaho Sage-Grouse Planning Map. Pink areas illustrate burns in areas that are not key habitat or potential restoration areas, or that are outside of Sage-Grouse Planning Areas.

An increased incidence of wildfire can pose a substantial threat to sage-grouse and sage-grouse habitat in Idaho in several ways. Frequent and/or large-scale wildfires (e.g., tens of thousands of acres or more) can remove substantial portions of remaining nesting, brood, or winter habitat in the course of hours or days, rendering vast areas unsuitable or marginal for sage-grouse for many years. Fire can also fragment existing habitats further by removing or reducing sagebrush cover or by impairing the progress of expensive sagebrush-steppe restoration efforts.

Studies of fire-effects on sage-grouse have been done in the context of both wildfires and prescribed fires. Some of these studies are referenced here in the wildfire section due to the similarity of the issues. Most fire-effects studies have been short-term involving a span of ten years or less (Crawford et al. 2004). The specific effects of fire on sage-grouse habitat vary and are driven by a number of factors including site potential; ecological condition; limiting functional plant groups; and the pattern, size, and season of burning (Crawford et al. 2004).

On the Hart Mountain National Antelope Refuge in Oregon, Byrne (2002) reported nest success in burns > 20 years old (29%, n=6/21 nests) was similar to nest success in unburned areas (28%, n=49/177 nests) but was zero in burns ≤ 20 years old (n=0/5 nests). Habitat characteristics around nests in burns > 20 years old were similar to those of unburned areas.

A nine-year study in Idaho suggested that late summer prescribed fire in Wyoming big sagebrush did not improve brood habitat (Connelly et al. 1994, Fischer et al. 1996a). Fischer et al. (1996b) noted that the abundance of *Hymenoptera* (e.g. ants) was significantly lower in burned habitats the second and third years after the burn. In a study of twenty wildfires and prescribed burns in Idaho, Nelle et al. (2000) reported that the relative abundance of ants and beetles, important sage-grouse chick foods, was significantly greater in the 1-year old burn category, but had returned to unburned levels by 3-5 years postburn; no difference was detected in forb abundance between different aged burns.

In another Idaho study, Pedersen et al. (2003) modeled the effects of sheep grazing and fire on sage-grouse populations. The study area included higher elevation (4,800-5,400 ft) breeding habitat characterized by mountain big sagebrush (with stands of threetip sagebrush also present) and winter habitat characterized by black sagebrush. With respect to fire alone, model simulations suggested that frequent (every 17 years) large wildfires (impacting 10% or more of the spring use habitat) are very detrimental to sage-grouse and could cause local extinctions.

In Oregon, frequency of ground-dwelling beetles was not influenced by prescribed fire; spring and fall burning increased total forb cover and diversity, but decreased sagebrush cover (Pyle and Crawford 1996). In mountain big sagebrush communities,

fire can enhance native perennial forbs and grasses where sagebrush is abundant if a healthy assemblage of native grasses and forbs is present and invasive plant species are limited (Crawford et al. 2004). Prescribed fire should not be used where sagebrush cover is a limiting factor for sage-grouse (Crawford et al. 2004). In general, caution should be exercised in the use of prescribed fire in sage-grouse habitats (Byrne 2002, Connelly et al. 2004, Crawford et al. 2004).

Spatial analysis of all wildfire occurrences, including repeat burns between 1990 and 2003, indicate a total of 2,436,936 acres of wildfire occurred in key or potential restoration habitat within the 13 SGPAs (Table 4-4). Of this total, 1,413,588 acres (58%) occurred in the adjacent Big Desert, East Magic Valley, and West Magic Valley SGPAs. An additional 370,577 acres of wildfire occurred in sage-grouse habitat within the Jarbidge SGPA. Although wildfire poses a potential risk to sage-grouse habitat in all SGPAs, it appears that this threat has been especially problematic in these SGPAs during the past fifteen years. Appropriate wildfire suppression, rehabilitation, restoration, and education efforts are warranted.

Table 4-4 Total wildfire acres in sage-grouse habitat¹² by Sage-grouse Planning Area, 1990-2003 (USDI-BLM 2004b)

Acres ¹³																
SGPA	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Misc.	Total
Big Desert	-	6767	12599	-	250	7308	238690	2708	23063	179698	185780	1839	23	177	102	659004
Challis	-	-	-	-	-	-	-	-	-	-	-	-	-	6703	-	6703
Curlew	2533	9854	27252	-	12647	576	321	13	8605	1289	10384	8492	-	712	-	82678
E Idaho Uplands	1005	3130	25610	-	2350	1379	2565	-	-	4099	6118	-	89	2841	-	49186
E Magic Valley	12295	6704	176195	60	36460	30225	206232	335	2825	69871	5815	6810	9137	7459	-	570423
Jarbridge	2299	9891	16127	-	17627	112412	57964	6025	5873	26510	72323	19588	21569	2369	-	370577
Mt. Home	183	1216	24698	-	-	-	1009	1026	14	684	20657	1234	-	-	-	50721
Owyhee	12204	4534	1671	440	12523	2083	6675	87	156	22483	15611	15415	13808	211	-	107901
Shoshone Basin	-	-	-	-	135	-	732	-	-	183	5574	309	-	-	-	6933
S Magic Valley	12319	34	3430	-	4875	656	9659	197	338	7802	55306	2009	10266	497	-	107388
Upper Snake	-	3021	2438	47	29781	8497	21945	495	142	31541	39510	22	121	52927	2153	192640
West Central	1978	3328	15422	-	79	-	7045	277	3131	71	2812	2829	10217	1432	-	48621
W Magic Valley	73257	1190	28238	946	14	3592	36880	3408	2070	3785	9666	17911	68	3136	-	184161
Total	118073	49669	333680	1493	116741	166728	589717	14571	46217	348016	429556	76458	65298	78464	2255	2,436,936

¹² Sage-grouse habitat areas as delineated on the 2004 Idaho Sage-grouse Habitat Planning Map. Inclusive of areas defined as key sage-grouse habitat, and potential restoration areas (perennial grassland, annual grassland, and conifer encroachment areas).

¹³ Table reflects total acres of wildfire in sage-grouse habitat as defined in footnote 12, above, including repeat fires. Figures are rounded to the nearest acre. "Misc." column reflects acres of fire that occurred sometime during 1999-2003, but the specific year was not available.

- **Restoration and burned area rehabilitation:** Connelly et al. (2004) discuss aspects of wildfire rehabilitation and restoration in considerable detail. Given the magnitude and frequency of wildfires and the potential for loss of sagebrush and expansion of invasive plants in southern Idaho, restoration activities and burned area rehabilitation will continue to play a critical role in sage-grouse conservation. Monsen et al. (2004) (see http://www.fs.fed.us/rm/pubs/rmrs_gtr136.html) provide a comprehensive and up-to-date source of information relative to the restoration of western rangelands. See also Lambert (2005) for descriptions, recommended seeding rates, and other useful information for nearly 250 species of native and non-native grasses, forbs and shrubs.

BLM Public Land Statistics indicate that between 1997-2004, over \$31 million was expended on Idaho Emergency Fire Rehabilitation and Stabilization projects alone, inclusive of revegetation, fencing, weed control, monitoring and related efforts. While burned area rehabilitation is essentially a reactive approach, occurring after wildfires, the protection, strategic planning, and restoration of areas *prior to* wildfire is also critical, and of even greater priority. Several important strategic processes have been recently initiated or completed to that end. These include:

- BLM's Great Basin Restoration Initiative (GBRI), introduced in 1999, provides a strategy for prioritizing, protecting and restoring western landscapes. Several GBRI projects underway, that will improve our understanding and capability for rangeland restoration include: Great Basin Native Plant Selection and Increase Project; Coordinated Intermountain Restoration Project; Integrating Weed Control and Restoration for Great Basin Rangeland; and A Regional Experiment to Evaluate Effects of Fire and Fire Surrogate Treatments in the Sagebrush Biome.
- Federal agencies (BLM, USFS) recently completed Fire Management Plan (FMP) revisions in accordance with National Fire Plan direction. Each plan contains suppression objectives to keep wildfires to a minimum size with consideration of sage-grouse habitat, including restoration areas. Specific suppression objectives have been established by the Fire Management Unit.¹⁴ FMPs also identify areas for fire hazard reduction, which will reduce the duration of the fire season and enable suppression forces to more easily contain and minimize the size of fires.
- Idaho BLM is preparing a "Fire, Fuels, and Related Vegetation Management Direction Plan Amendment," which will amend 12 Land Use Plans in Shoshone, Burley, Pocatello, and Idaho Falls. The final decision is scheduled for October 2006. The preferred alternative recognizes that the sagebrush steppe ecosystem and its associated wildlife species, including sage-grouse, are at risk from increased wildfire and other disturbances. The emphasis of this alternative is to

¹⁴ Areas with similar resource objectives.

maintain existing high quality sagebrush steppe habitat and to increase the quantity of resilient sagebrush steppe through post-wildland fire rehabilitation and proactive restoration. Wildland fire efforts would emphasize protection of sagebrush steppe habitats.

- A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment (10-Year Comprehensive Strategy) was created under the National Fire Plan (August 2000) as a response to severe wildland fires and their impacts. The 10-Year Comprehensive Strategy lists four goals with goal three to Restore Fire-Adapted Ecosystems by rehabilitation, restoration, monitoring, using best available science and information. This includes preventing invasive species and restoring healthy, diverse and resilient ecological systems to minimize uncharacteristic severe wildfires.

4.3.1.3 Wildfire conservation measures

Goal: To reduce the risk, incidence and extent of wildfires within Sage-grouse Planning Areas, and to ensure that burned areas are rehabilitated, and historically altered sites are restored, where appropriate, in a manner consistent with long-term habitat needs for sage-grouse.

Issue Addressed	Rationale	Conservation Measure(s)
Altered fuels and fire regimes	Areas dominated by cheatgrass or medusahead have higher frequency of wildfire and minimal habitat value.	<ol style="list-style-type: none"> 1. See conservation measures for Annual Grasslands section. 2. Identify and prioritize annual grasslands most conducive for restoration to perennial species. Coordinate closely with USGS Snake River Field Station, GBRI, Universities, local partners, and IDFG, as appropriate. 3. Since it is impossible to restore large annual grasslands all at once due to cost and logistics, consider an incremental or “buffer” approach, to protect existing intact habitat. That is, where large annual grasslands border key or other important areas such as recent restoration projects, create “buffers” by progressively converting broad bands of the adjacent annual grasslands to perennial species. As perennial grasses, forbs, and sagebrush become established, expand the buffers outward. This practice, over time, can reduce fire risk by conversion of high fire hazard annuals to lower hazard perennial fuels. Where funding and logistical factors permit, larger-scale conversions, rather than the buffer approach, may be more appropriate.

Issue Addressed	Rationale	Conservation Measure(s)
Reduction or modification of habitat	Wildfires can reduce or fragment already limited habitat, including recent restoration project areas, and can facilitate the proliferation of invasive plants.	<p>Wildfire suppression tactics:</p> <ol style="list-style-type: none"> 1. In the event that multiple ignitions occur in a local suppression unit area, suppression priorities are to protect human life and property. In situations where human safety or property will not be compromised or threatened, employ fire suppression tactics that protect sagebrush ecosystems by minimizing the average size of unplanned fires, maintaining productive sage-grouse habitat, and maintaining sagebrush cover. In the event of multiple fire starts in sagebrush ecosystems, suppression priority will be as outlined by specific Fire Management Unit (FMU) based on the following general guidelines: <ul style="list-style-type: none"> <i>Priority 1</i> - Stronghold habitats (subset of key habitat on the Idaho Sage Grouse Habitat Planning Map). <ol style="list-style-type: none"> a. Wyoming big sagebrush sites (in general, lower elevations). b. Mountain big sagebrush sites (in general, higher elevations). c. Other habitats (e.g. early sagebrush, low sagebrush sites). <i>Priority 2</i> - Key habitat. <ol style="list-style-type: none"> a. Wyoming big sagebrush sites (in general, lower elevations). b. Mountain big sagebrush sites (in general, higher elevations). c. Other habitats. <i>Priority 3</i> - Restoration habitat. <ol style="list-style-type: none"> a. Areas with established or recovering sagebrush. b. Areas with minimal or no sagebrush cover. <i>Priority 4</i> - Juniper or annual grasslands where delaying initial attack does not threaten priorities 1-3 above. 2. BLM and USFS line officers will ensure that a knowledgeable field level Resource Advisor is available for any “extended attack” fire (>300 acres in size) within or threatening sage-grouse habitats, including stronghold, key, and potential/existing restoration areas. Availability by phone or “on-call” is appropriate in some circumstances, such as during times of low fire danger. During times of high or extreme fire danger, red flag, or other similar conditions, resource advisors should be field-ready on short notice. 3. In all sage-grouse habitats (key, stronghold, potential

Issue Addressed	Rationale	Conservation Measure(s)
		<p>restoration areas), suppress fires and hotspots in unburned areas including interior islands, patches, or strips of sagebrush if doing so will not compromise fire crew safety, poses little risk of escape, and to the extent that resources allow (limited water supplies, etc.). Do not square-up or burn-out islands or interior patches of sagebrush. Such areas may provide important remnant habitats post-fire, are useful in assessing pre-burn vegetation conditions, and serve as a source of on-site sagebrush seed, facilitating the post-fire reestablishment of sagebrush.</p> <p>4. When fires threaten or occur within sage-grouse stronghold habitats, deploy the appropriate pre-identified appropriate management response as soon as possible to minimize loss of habitat to fire and to reduce the scale of subsequent ESR efforts. Depending on the nature of the fire, appropriate tools may include heavy or medium engines, dozers, hand crews, single engine aerial tankers, large tankers, or others. In general, the intent of this conservation measure is to encourage fire management officers, dispatch shift supervisors, and incident commanders to be proactive, to the extent feasible, in deploying suppression resources in order to minimize habitat loss. Fire crew safety will be the first priority.</p> <p>5. Burn-out/backfiring operations should be conducted in a manner that minimizes the loss of sagebrush, while still providing for public and fire crew safety.</p> <p>6. Use post-fire After Action Reviews and/or evaluations on fires that are large enough and/or intense enough to have adversely affected sage-grouse habitat. The intent of the review is to facilitate making improvements or adjustments in priorities, tactics or resource availability in preparation for potential fires. During multiple or sequential large-scale fire events this measure may need to be deferred. The urgency of the review depends on when the fire occurred in the fire season, how typical or significant it was, and if there are clearly opportunities to learn important lessons.</p> <p>Strategic wildfire suppression planning:</p> <p>1. Ensure Fire Management Plans (FMPs), updated annually, re-assess priorities and incorporate the conservation measures outlined in this plan, particularly identifying the appropriate management response in Fire Management Units (FMUs) where stronghold and key habitat exist.</p>

Issue Addressed	Rationale	Conservation Measure(s)
		<ol style="list-style-type: none"> 2. In FMPs, annually update the Idaho Sage-grouse Habitat Planning Map (see Chapter 5). Update Fire Management Plans and Fire Management Unit databases as needed to incorporate new sage-grouse habitat related information and wildfire suppression priorities in sage-grouse or restoration habitats. 3. In areas of limited water availability and/or remote locations, coordinate with LWGs and appropriate agency personnel to explore creative options for the establishment of fill hydrants along existing pipelines, new emergency water storage tanks or other similar facilities, or upgrading/modification of existing wells or pipelines. Locate such water access facilities near suitable access roads. Mark locations of such sites on maps for fire crews, resource advisors, and dispatchers. Wildlife water guzzlers can also be designed in concert with such projects in sage-grouse habitats where water is limited. 4. Where feasible, consider staging initial attack resources in high fire incident areas to ensure quicker initial attack response times in remote areas. 5. At the wildland-urban interface bordering rangelands, employ pre-suppression tactics, public education and vegetation treatments to minimize or reduce the risk of the escape of human-caused fire into sage-grouse key or restoration habitat. 6. Strategically place pre-treated strips/areas (e.g., mowing, herbicide application, strictly managed grazed strips, etc.) to aid in controlling wildfire should wildfire occur near critical habitats. <p>Firefighter training:</p> <ol style="list-style-type: none"> 1. Provide annual training for rangeland fire personnel (including appropriate Rural Fire Department (RFD) personnel), public affairs staff, resource advisors, and others, as appropriate, to include awareness of issues and potential impacts of suppression activities in sage-grouse habitats and other resource issues of management concern.
Human-caused ignitions	Over half of wildfires in Idaho are human-caused.	<p>Public outreach and education:</p> <ol style="list-style-type: none"> 1. Increase public awareness of fire danger by installing and maintaining additional fire danger signs along main access roads.

Issue Addressed	Rationale	Conservation Measure(s)
		<ol style="list-style-type: none"> 2. Increase public outreach, information, and education related to sagebrush ecosystems, fire risk mitigation, fire ecology and related issues. Examples include. media interviews and articles, presentations to schools and civic organizations, brochures or similar efforts. 3. Via media opportunities increase public awareness and understanding of fire-related risk during times of high to extreme fire danger and red flag conditions. 4. Work closely with railroad companies to minimize wildfire ignitions, improve suppression response, where needed, and to manage fuels/invasives within railroad rights-of-way. <p>Enforcement of restrictions or closures and related measures:</p> <ol style="list-style-type: none"> 1. Increase local enforcement of existing fire restrictions or closures in accordance with the High Fire Danger Closure and Restriction Plan. 2. Promote practices that discourage or limit firelines (e.g., dozer lines or other trails created by equipment) from being converted to 2-track roads or OHV/ATV trails.
Restoration and burned area rehabilitation	Analyze burned area to assess possibilities of natural regeneration. Deliberate seeding of some areas is essential to ensure that needed habitat components are restored.	<ol style="list-style-type: none"> 1. Assess pre-burn vegetation via mapping, fuels/vegetation surveys or allotment monitoring records to determine plant species composition and diversity. Consider/evaluate fire severity. Acquire satellite or aerial imagery of the burn, where available and feasible, to help estimate the extent of burned and unburned areas, including islands. 2. In the absence of information for areas directly affected by the burn, evaluate unburned islands and the areas adjacent to the burn to help predict plant species composition and diversity within the burned area. 3. Estimate from the findings of 1 and 2 and a site potential analysis if rehabilitation is necessary to achieve the habitat goals for the area. 4. Ensure that sage-grouse habitat considerations are incorporated into restoration and burned area rehabilitation plans, particularly in or near stronghold, key and isolated habitats. 5. Emphasize the use of native plant materials to the greatest extent possible, and as appropriate for site

Issue Addressed	Rationale	Conservation Measure(s)
		<p>conditions. Seeds should be certified weed free.</p> <ol style="list-style-type: none"> <li data-bbox="776 289 1427 533">6. Use proper site-preparation techniques (e.g., seedbed preparation, control of invasives, weed-control), seeding techniques, and seed mixes in designing restoration and burned area rehabilitation plans. For example, the restoration of annual grasslands may require preparatory chemical treatments and/or an exotic/native seed mix. Perennial grasslands (existing seedlings or native) may require seeding or planting of sagebrush. <li data-bbox="776 562 1427 865">7. When planting or reseeding sagebrush, favor the sagebrush species, subspecies, that are appropriate for the ecological site. Source identified seed is preferable. To maximize the likelihood of establishment, consider multiple approaches, such as aerial seeding, ground broadcast seeding with harrow or roller, and planting of seedlings in strategic patches or strips. Avoid seeding sagebrush or other shrubs near road margins if the road and road margin might otherwise serve as a fuel break in the event of future fires. <li data-bbox="776 894 1427 987">8. When using exotic perennial grasses and forbs in restoration use species whose growth form, species, and phenology, most closely mimic native species. <li data-bbox="776 1016 1427 1079">9. Provide for noxious weed control in burned area rehabilitation projects.

Research, monitoring or evaluation needs: Identify and prioritize specific areas for habitat restoration and fuels modification (e.g., cheatgrass). Identify and prioritize areas bordering roads, railroads, farmlands or other areas where cheatgrass or other vegetation poses a high fire risk. Research methods to improve the establishment and survival of sagebrush seeding efforts. Expand efforts to improve the commercial supply of native grasses and forbs suitable for Idaho rangelands.

4.3.2 Infrastructure

In the context of this Plan, the term infrastructure relates to human-made features on the landscape that provide or facilitate transportation, energy, and communications activities.

4.3.2.1 Threat summary and background

Infrastructure development, while essential for society, can nonetheless result in essentially irretrievable losses of sage-grouse habitat or fragmentation of habitat, foster the spread of invasives, facilitate predation, increase risk of mortality, increase human-disturbance or access, or influence behavior of sage-grouse. The significance of these threats is difficult to quantify and is likely to depend on site-specific influences. Six priority infrastructure features that currently affect or potentially affect sage-grouse and sage-grouse habitat in Idaho are addressed in greater detail below. Linear features include utility lines, roads, active railroads, and oil and gas pipelines. Nonlinear features of interest include wireless communications towers, and wind energy facilities. Additional factors not evaluated in this plan that may be of future concern to sage-grouse conservation in Idaho, depending on locality, include activities such as airport development or expansion; development of coal-fired power plants, geothermal or nuclear energy resources; or construction of similar facilities. As project proposals arise, LWGs and others concerned with sage-grouse conservation should actively engage in opportunities to provide comment and recommendations for avoiding or mitigating impacts to sage-grouse and other resource values.

4.3.2.2 Summary of key conservation issues

4.3.2.2.1 Linear infrastructure features

The following discussion of linear infrastructure features includes a summary of conservation issues associated with utility lines, roads, active railroads, and oil and gas pipelines. Where linear infrastructure features have been quantified in the discussions that follow, the term “buffer” refers to the area *potentially influenced* by the presence of these features on the landscape, based on assumptions of noise, predator foraging distances, and the likelihood of invasive plant establishment. The buffers used vary by infrastructure type, and are based on a similar buffer analysis presented in Connelly et al. (2004). While buffering provides a means to quantify these features, it must be recognized that actual impacts by the various infrastructure features on sage-grouse will likely vary from area to area depending on many different factors.

- **Utility lines:** Structures associated with utility corridors provide perches and nesting substrates for raptors and ravens (Knight and Kawashima 1993, Steenhof et al. 1993). Such structures may result in an increased concentration of raptors and ravens along utility corridors, which may pose a threat to sage-grouse by increasing their risk to avian predation in some areas. Sage-grouse may also avoid utility lines and other tall structures, though published data are limited. Corridors, access roads, and associated rights-of-way, may also facilitate the spread of invasive plant species (Gelbard and Belnap 2003) and facilitate the movement of predators (Connelly et al. 2004). Utility lines may also directly affect sage-grouse by posing a collision hazard (Braun 1998).

While it was not possible to map and quantify all utility lines in Idaho at the scale of this plan, information for major power transmission lines (> 138 kv) was readily available. In Idaho, major power transmission lines within SGPAs total 1,503 miles. All SGPAs are affected by inclusion of major power transmission lines (USDI BLM 2004c; Table 4-5). Applying a 5 km (3.1 mile) buffer on each side to account for potential influences of avian predation (Connelly et al. 2004; S. Knick personal communication 2/9/2005), power line buffers incorporate approximately 4,526,893 acres, or 28% of all SGPAs combined. Some SGPAs are affected more than others. For example, while major power line buffers incorporate relatively small portions of the Curlew and Owyhee SGPAs, over 55% of the East Idaho Uplands, Mountain Home, West Central and West Magic Valley SGPAs are incorporated. Numerous smaller power distribution lines and telephone lines, not quantified or spatially portrayed here, also potentially influence sage-grouse and/or habitat, and may be of additional interest to LWGs.

Opportunities exist for reducing or mitigating potential impacts. Best Management Practices are currently under development that will emphasize site-specific solutions (B. Dumas, Idaho Power Co., personal communication). In general, some impacts related to transmission lines can be reduced or minimized by managing roads, rehabilitating disturbed areas, controlling noxious weeds, and timing construction or maintenance activities to minimize disturbance.

Table 4-5 Idaho Sage-grouse Planning Areas and major power transmission lines (USDI BLM 2004c)

POWER TRANSMISSION LINE 5 km BUFFER ANALYSIS					
SGPA Name	Total acres within SGPA boundary	Length of transmission lines (meters) within SGPA	Transmission line mileage within SGPA	5km (6.2 mile) buffer¹⁵ acres within SGPA	Percentage of SGPA covered by 5km buffer
Big Desert Planning Area	884,715.33	84,089.08	52.25	234,972.35	27%
Challis Planning Area	1,826,860.33	189,349.82	117.66	341,561.96	19%
Curlew Planning Area	476,227.62	20,103.73	21.49	67,665.58	14%
East Idaho Uplands Planning Area	538,483.11	156,375.18	97.17	301,589.71	56%
East Magic Valley Planning Area	1,410,610.29	452,811.75	281.36	648,675.20	46%
Jarbridge Planning Area	1,250,139.39	75,172.38	46.71	217,389.16	17%
Mountain Home Planning Area	305,934.77	126,509.29	78.61	180,140.20	59%
Owyhee Planning Area	3,230,100.47	152,434.34	94.72	396,016.09	12%
Shoshone Basin Planning Area	187,380.44	73,387.31	45.60	87,300.74	47%
South Magic Valley Planning Area	898,358.79	96,337.10	59.86	219,593.29	24%
Upper Snake Planning Area	3,360,620.46	391,955.02	243.55	790,142.31	24%
West Central Planning Area	931,953.66	308,278.37	191.56	578,960.24	62%
West Magic Valley Planning Area	774,265.85	293,031.37	182.08	462,886.61	60%
TOTALS	16,075,650.48	2,419,834.74	1,503.62	4,526,893.45	28%

¹⁵ Buffer of 5 km each side of transmission line as per by Connelly et al. (2004).

Idaho Sage-Grouse Planning Areas and Major Transmission Lines

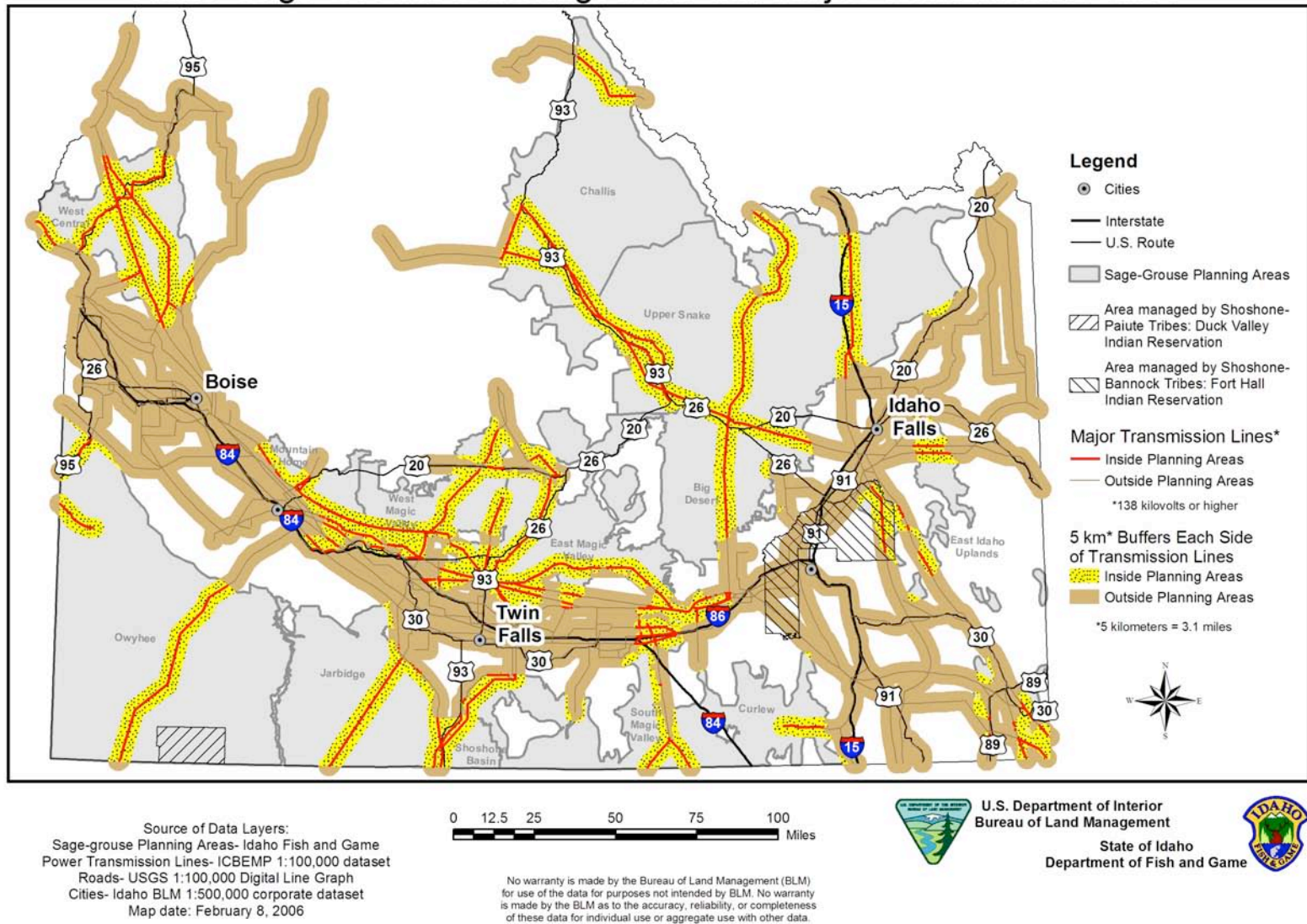


Figure 4-3 Idaho Sage-grouse Planning Areas and major transmission lines

- **Major paved roads:** It was not possible to quantify all improved and unimproved roads at the scale of this plan. However, major paved roads (State, U.S., and/or Interstate Highways) intersect most SGPAs in Idaho, with the exception of the Jarbidge (Table 4-6 and Figure 4-4). In general, traffic associated with major roads can lead to mortality of sage-grouse due to collisions. Habitat changes or noise associated with roads and traffic can modify animal behavior. Roads can also fragment landscapes, facilitate the spread of noxious weeds, and lead to increased use by humans. The incidence of human-caused fires is also closely related to the proximity of roads (Connelly et al. 2004). While roads pose a potential threat, they also can facilitate access for fire suppression activities, provide access for habitat and population monitoring, and for implementation of restoration projects.

Spatial analysis of major roads (Figure 4-4) in Idaho indicate there are approximately 977.6 miles of major paved roads (Interstate, U.S., state) intersecting Idaho SGPAs (USDI-BLM 2004d). Applying a 10 km (6.2 mile) buffer along each side of these roads to account for an influence from predation and noise disturbance (Connelly et al. 2004), the total buffer area influenced by major paved roads within SGPAs is 6,890,485 acres. SGPAs with the greatest total major road mileage include the Challis, East Magic Valley, and Upper Snake. For eight SGPAs, Challis, Curlew, East Magic Valley, Mountain Home, Shoshone Basin, Upper Snake, West Central, West Magic Valley, >50% of the area is potentially influenced by major roads, based on the 10 km buffer concept. None of the Jarbidge SGPA appears influenced by major paved roads. While the degree of threat to sage-grouse in terms of road mileage or road density is presently uncertain, the documentation of existing conditions may be useful as a baseline for future analyses.

While major paved roads are of primary interest, other roads (e.g., paved or graveled county roads, BLM, USFS, private, other) can also pose a risk to sage-grouse or sage-grouse habitat through factors such as increased human access, Off-Highway Vehicle (OHV) use, spread of invasive species, and increased wildfire risk and collisions. Vehicle-related mortalities of juvenile sage-grouse presumably foraging for milky forbs (e.g., *Tragopogon*, *Lactuca*) or other species along the Red Road, Jacoby Road, and the A2 Yale-Kilgore Road in the Upper Snake SGPA have been noted (M. Commons-Kemner, IDFG and R. Mickelsen USFS, personal communications). Some effort has been made by IDFG to reduce vehicular strikes along certain roads in the spring by mowing sagebrush nearby in an effort to encourage males to display off of the road itself (R. Mickelsen USFS personal communication).

Table 4-6 Idaho Sage-grouse Planning Areas and major roads ¹⁶ (USDI BLM 2004d)

MAJOR ROADS 10 km BUFFER ANALYSIS					
SGPA Name	Total Acres within SGPA boundary	Length of major roads (meters) within SGPA	Length of major roads (miles) within SGPA	Total Acres of buffered¹⁷ major roads within SGPA	Percentage of SGPA covered by 10km buffer
Big Desert Planning Area	884,715.33	57,350.87	35.64	289,897.35	32.77%
Challis Planning Area	1,826,860.33	291,023.46	180.83	1,114,792.15	61.02%
Curlew Planning Area	476,227.62	74,939.22	46.57	367,829.76	77.24%
East Idaho Uplands Planning Area	538,483.11	17,484.88	10.86	128,238.93	23.81%
East Magic Valley Planning Area	1,410,610.29	177,343.04	110.20	841,070.06	59.62%
Jarbridge Planning Area	1,250,139.39	0.00	0.00	28,262.53	2.26%
Mountain Home Planning Area	305,934.77	37,046.81	23.02	182,483.13	59.65%
Owyhee Planning Area	3,230,100.47	127,989.14	79.53	680,616.32	21.07%
Shoshone Basin Planning Area	187,380.44	29,096.02	18.08	108,809.65	58.07%
South Magic Valley Planning Area	898,358.79	56,142.47	34.89	426,392.28	47.46%
Upper Snake Planning Area	3,360,620.46	462,974.06	287.68	1,752,052.78	52.13%
West Central Planning Area	931,953.66	104,482.95	64.92	394,815.77	42.36%
West Magic Valley Planning Area	774,265.85	137,424.93	85.39	575,224.53	74.29%
Total	16,075,650.48	1,573,297.85	977.60	6,890,485.25	42.86%

¹⁶ Based on USGS 1:100,000 Digital Line Graph.

¹⁷ Buffer of 10 km each side of road, as per Connelly et al. (2004). Jarbridge SGPA shows buffer acreage despite 0.0 miles of major roads due to overlap of buffers from roads outside but near the SGPA boundary.

Idaho Sage-Grouse Planning Areas and Major Roads

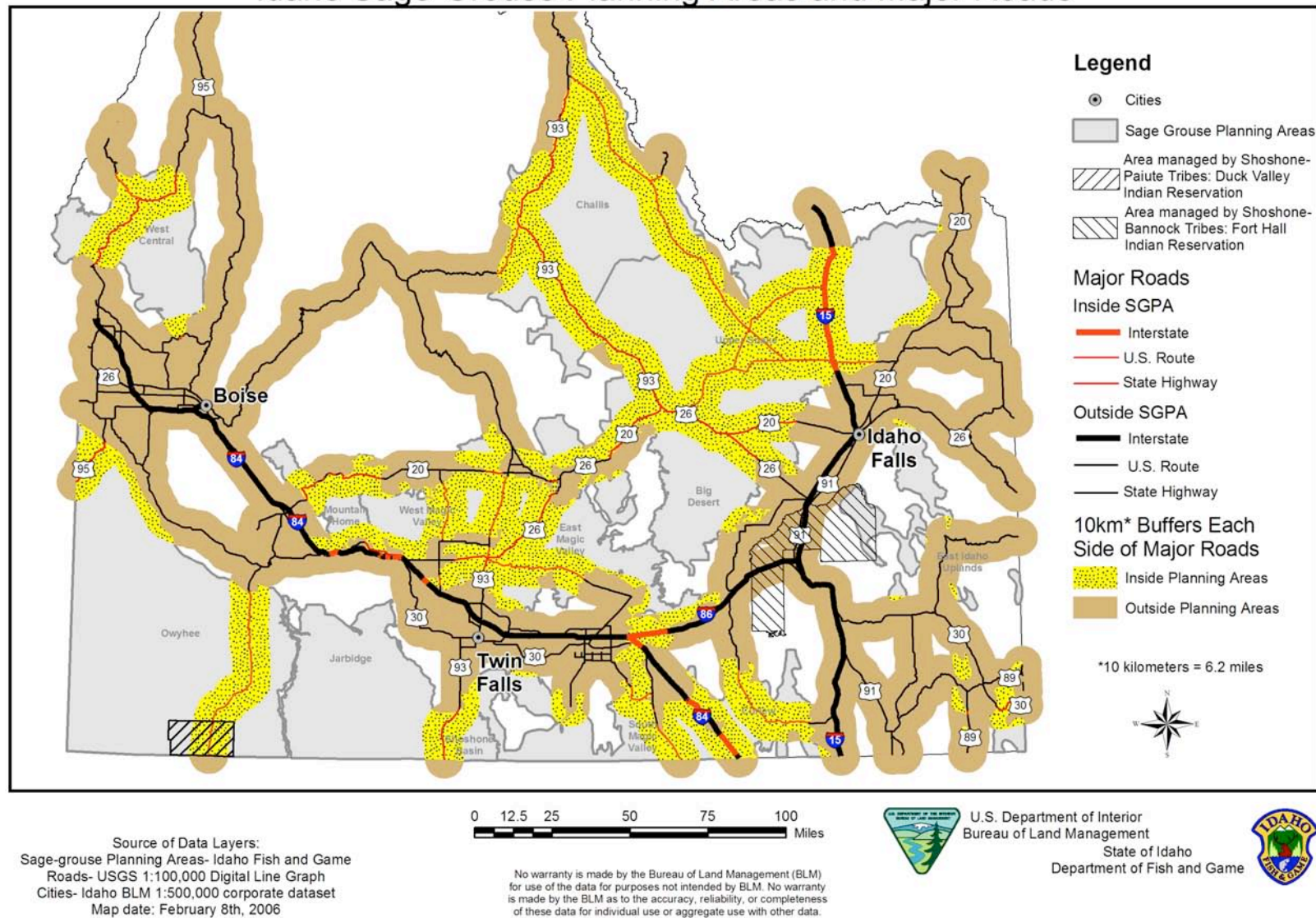


Figure 4-4 Idaho Sage-grouse Planning Areas and major roads

- **Active Railroads:** Railways are largely attributed with the initial spread of cheatgrass in the intermountain region (Young and Sparks 2002 cited in Connelly et al. 2004). Wildfires sparked by trains can lead to loss of sagebrush habitats and promote the further spread of cheatgrass. Active railroads intersect portions of seven of the 13 SGPAs in Idaho (Table 4-7 and Figure 4-5). While this threat factor collectively impacts a relatively small proportion of SGPAs in terms of mileage and buffer acreage, impacts can be important locally. For example, from 1980-2003, railroads accounted for 14% and 10% of wildfire ignitions in the East and West Magic Valley SGPAs, respectively (USDI BLM 2004e). Rapid fire suppression and provision for perennial species along railroad corridors are important factors in managing this threat.

Table 4-7 Idaho Sage-grouse Planning Areas and active railroads¹⁸ (USDI BLM 2004^e)

RAILROAD 3 KM BUFFER ANALYSIS					
SGPA Name	Total acres within SGPA boundary	Length of active railroads (meters) within SGPA	Active railroad mileage within SGPA	3 km (1.86 mile) buffer¹⁹ acres within SGPA	Percentage of SGPA covered by 3 km buffer
Big Desert Planning Area	884,715.33	60,839.83	37.80	84,122.99	10%
Challis Planning Area	1,826,860.33	0.00	0.00	0.00	0%
Curlew Planning Area	476,227.62	0.00	0.00	168.17	0%
East Idaho Uplands Planning Area	538,483.11	10,027.12	6.23	28,595.43	5%
East Magic Valley Planning Area	1,410,610.29	122,369.43	76.04	157,847.43	11%
Jarbridge Planning Area	1,250,139.39	0.00	0.00	0.00	0%
Mountain Home Planning Area	305,934.77	4,444.45	2.76	8,515.27	3%
Owyhee Planning Area	3,230,100.47	0.00	0.00	0.00	0%
Shoshone Planning Area	187,380.44	0.00	0.00	0.00	0%
South Magic Valley Planning Area	898,358.79	0.00	0.00	0.00	0%
Upper Snake Planning Area	3,360,620.46	100,436.98	62.41	163,198.69	5%
West Central Planning Area	931,953.66	20,414.05	12.68	20,227.78	2%
West Magic Valley Planning Area	774,265.85	44,177.05	27.45	69,732.60	9%
Total	16,075,650.48	165,028.07	225.38	532,408.36	

¹⁸ Based on US Census Bureau data 1:100,000

¹⁹ Buffer of 3 km each side of railroad, as per Connelly et al. (2004), to account for potential for invasive species.

Idaho Sage-Grouse Planning Areas and Railroads

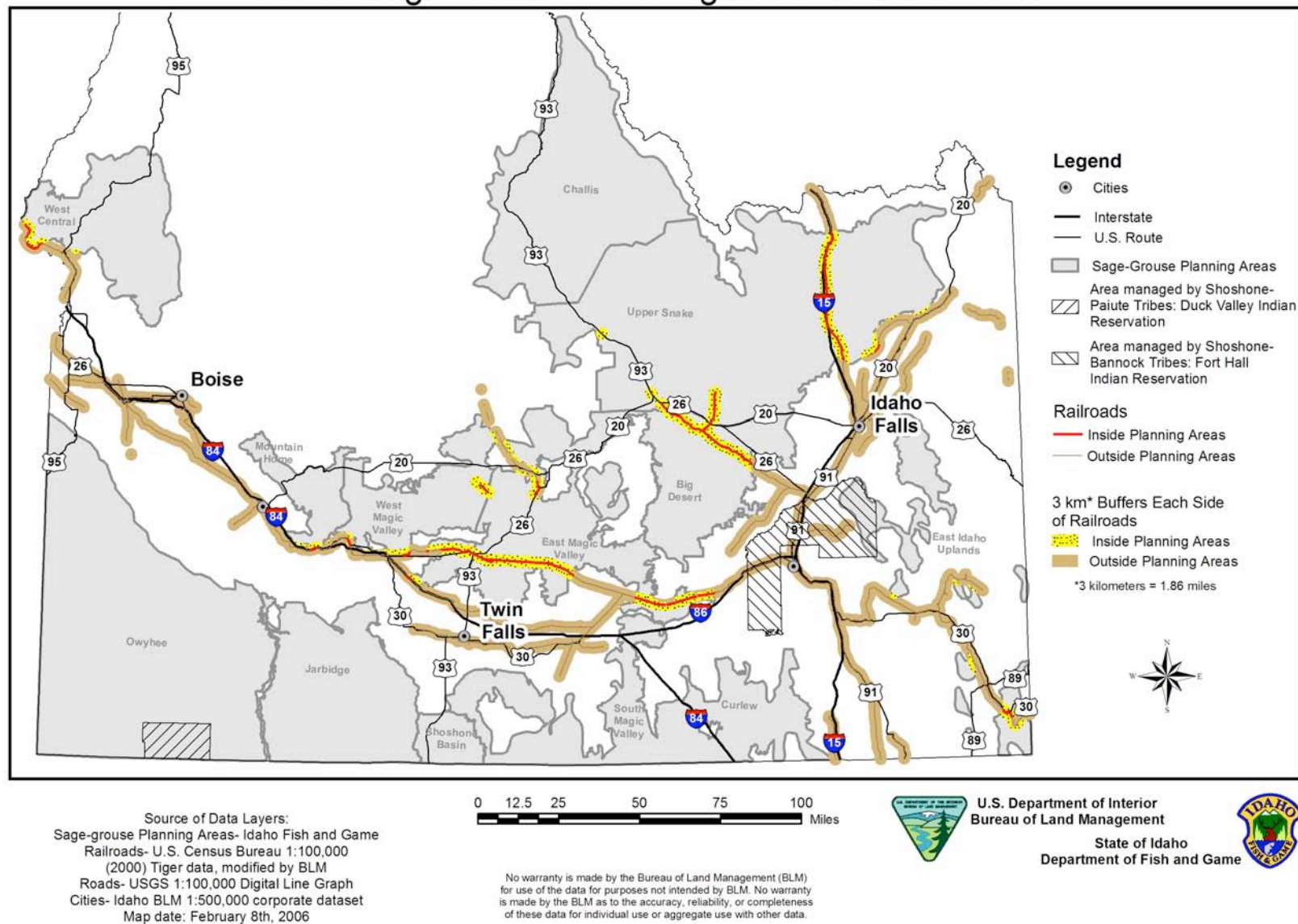


Figure 4-5 Idaho SGPAs and active railroads

- **Oil/gas pipelines:** Pipelines intersect minor portions of seven SGPAs (Table 4-8 and Figure 4-6). Surface disturbances and roads associated with pipelines pose a potential threat to sage-grouse or sage-grouse habitat, as they can facilitate predator movements, foster invasion by weedy plant species, and fragment habitat locally. The re-vegetation of lands disturbed by pipeline construction activities using the appropriate perennial species is crucial to minimize the likelihood of establishment by invasive plants. Periodic weed control is also warranted. Pipeline construction and maintenance activities in proximity to important seasonal habitats may disturb sage-grouse, particularly in the vicinity of leks. Managing the timing of such activities can help to reduce or eliminate disturbances.

Table 4-8 Idaho Sage-grouse Planning Areas and oil/gas pipelines²⁰ (USDI BLM 2004f)

PIPELINE 1 KM BUFFER ANALYSIS					
SGPA NAME	Total acres within SGPA boundary	Length of Pipeline (meters) within SGPA	Pipeline Mileage within SGPA	1 KM buffer²¹ acres	Percentage of SGPA Covered by 1 km buffer
Big Desert Planning Area	884715.33	0.00	0.00	0.00	0%
Challis Planning Area	1826860.33	0.00	0.00	0.00	0%
Curlew Planning Area	476227.62	6,422.98	3.99	4,918.70	1%
East Idaho Uplands Planning Area	538483.11	19,114.70	11.88	9,057.03	2%
East Magic Valley Planning Area	1410610.29	26,476.05	16.45	13,631.50	1%
Jarbridge Planning Area	1250139.39	0.00	0.00	0.00	0%
Mountain Home Planning Area	305934.77	27,584.55	17.14	8,716.65	3%
Owyhee Planning Area	3230100.47	103,157.36	64.10	51,163.33	2%
Shoshone Basin Planning Area	187380.44	0.00	0.00	0.00	0%
South Magic Valley Planning Area	898358.79	40,210.23	24.99	16,984.27	2%
Upper Snake Planning Area	3360620.46	0.00	0.00	0.00	0%
West Central Planning Area	931953.66	0.00	0.00	7.25	0%
West Magic Valley Planning Area	774265.85	20,772.38	12.91	10,189.35	1%
Total	16,075,650.48	243,738.25	151.45	114,668.10	

²⁰ Based on Idaho BLM 1:24,000 Corporate dataset

²¹ Buffer of 1 km each side of pipeline as per Connelly et al. (2004) to account for potential influences of predation, invasives, noise

Idaho Sage-Grouse Planning Areas and Oil/Gas Pipelines

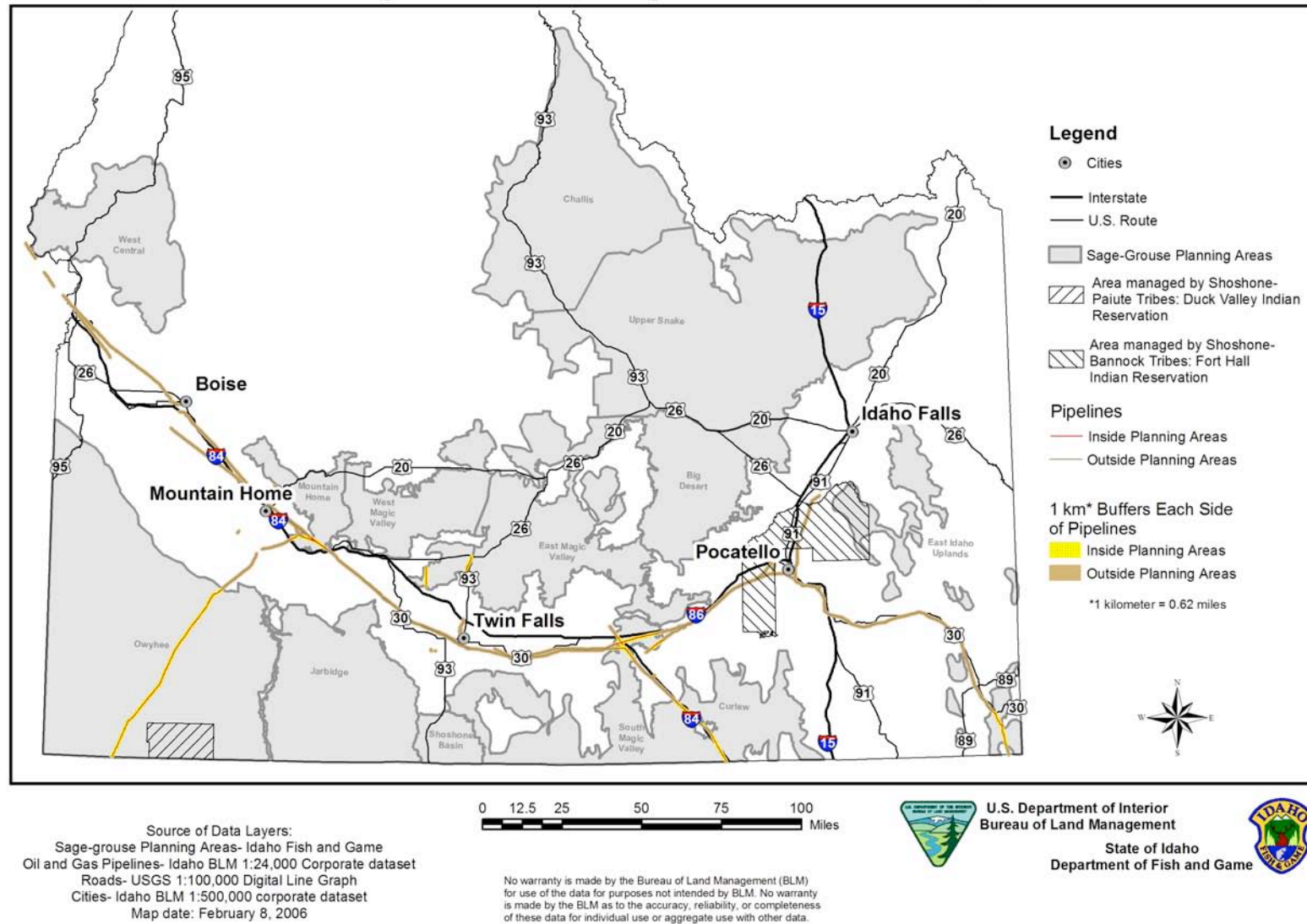


Figure 4-6 Idaho Sage-grouse Planning Areas and oil/gas pipelines

4.3.2.2.2 Cumulative effects and density of linear infrastructure features

While buffers of certain linear infrastructure features such as oil/gas pipelines and active railroads encompass relatively small portions of SGPAs, an analysis of merged buffers of all four linear features (where buffers for major roads, major power lines, active railroads and oil/gas pipelines are dissolved so that acres are not double counted) suggests that linear features, in the aggregate, influence substantial proportions of many SGPAs (Figure 4-7). Buffered linear features encompass over 50% of the acreage of ten SGPAs, and 75% or more of the Mountain Home, West Magic Valley, Curlew, and West Central SGPAs (Table 4-9). While the synergistic effects of linear infrastructure features on sage-grouse are unknown and difficult to predict, it is clear that proposals for further development in this regard should be carefully evaluated.

While an area-based analysis of buffered linear infrastructure features provides one means by which to evaluate the scale of infrastructure on the landscape, another metric is linear density, reported here in feet/acre (Table 4-9). While the biological meaning of particular linear density values to sage-grouse is unknown, the information nevertheless provides a quantitative baseline by which the relative magnitude of infrastructure density can be compared, by SGPA. Certain SGPAs, such as the Jarbidge (0.20 ft/acre) and Owyhee (0.38 ft/acre), show a relatively low linear density, while others are considerably higher (e.g. Mountain Home 2.05 ft/acre; West Magic Valley 2.13 ft/acre).

Idaho Sage-Grouse Planning Areas and Combined Linear Infrastructure Threats

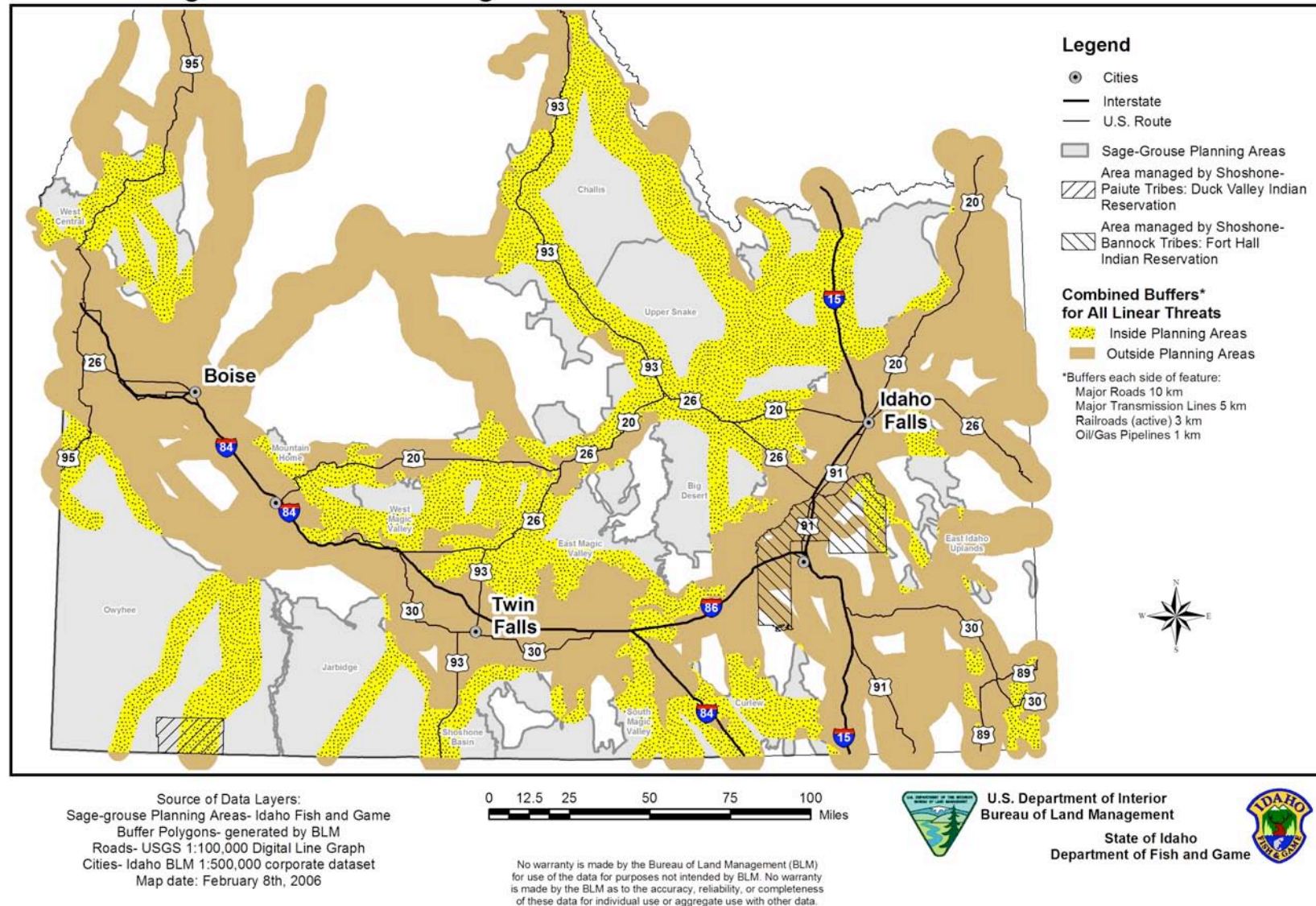


Figure 4-7 Idaho Sage-grouse Planning Areas and combined linear infrastructure threats

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Table 4-9 Idaho Sage-grouse Planning Areas and combined linear threat features²²

COMBINED LINEAR INFRASTRUCTURE BUFFER ANALYSIS				
SGPA Name	Total acres of SGPA	Total Acres of combined linear infrastructure buffers	Percentage of SGPA covered by combined linear infrastructure buffers	Density of clustered linear features²³ (ft/acre)
Big Desert Planning Area	884,715.33	417,663.12	47%	0.87
Challis Planning Area	1,826,860.33	1,120,877.34	61%	0.88
Curlew Planning Area	476,227.62	369,487.38	78%	0.70
East Idaho Uplands Planning Area	538,483.11	346,460.34	64%	1.20
East Magic Valley Planning Area	1,410,610.29	978,083.41	69%	1.83
Jarbridge Planning Area	1,250,139.39	227,967.10	18%	0.20
Mountain Home Planning Area	305,934.77	259,317.99	85%	2.05
Owyhee Planning Area	3,230,100.47	1,014,721.41	31%	0.38
Shoshone Basin Planning Area	187,380.44	108,811.86	58%	1.85
South Magic Valley Planning Area	898,358.79	490,758.54	55%	0.75
Upper Snake Planning Area	3,360,620.46	1,870,639.91	56%	1.00
West Central Planning Area	931,953.66	698,214.98	75%	1.48
West Magic Valley Planning Area	774,265.85	631,520.03	82%	2.13
Total	16,075,650.48	8,534,523.41		

²² Dissolved buffers for major power lines, major roads, active railroads and oil/gas pipelines.

²³ Linear density based on FRAGSTATS analysis of rasterized Sage-grouse Habitat Planning Map, assuming a 90 m grid cell. Clustered linear features were created by snapping linear features (major roads, major power lines, active railroads, gas/oil pipelines) into one feature if they were within 100 m (328 ft) of one another. Doing so ensures that nearby parallel features are counted only once.

4.3.2.2.3 *Nonlinear Infrastructure Features*

Two nonlinear infrastructure features evaluated in this Plan include wireless communications (i.e. cellular) towers and structures associated with wind energy development. While these features occupy points or relatively small areas on the landscape, their presence has the potential to disrupt behavior survival or sage-grouse habitat-use. Associated access roads, ground disturbance and increased human presence may also be of concern.

- **Wireless communication towers:** As with power lines, wireless communications towers provide unnatural vertical structure on the shrub-steppe landscape and provide potential perch or nest sites for raptors and ravens. The current distribution of wireless communications towers in Idaho is relatively extensive, but most currently occur along Interstate or other highway corridors outside of SGPAs (USDI BLM 2004g; Figure 4-8). Wireless towers nonetheless occur within each SGPA.
- **Wind energy development:** The National Energy Policy established in 2001 encouraged the development of renewable energy sources (National Energy Policy Group 2001). Federal lands in the western United States have significant potential to produce energy from wind (Connelly et al. 2004).

A number of wind energy-related structures currently exist within several SGPAs including the Owyhee, West Magic Valley, South Magic Valley, East Idaho Uplands, and Challis (USDI BLM 2004h; Figure 4-9).

The majority of these are wind monitoring towers 70 ft or shorter in height. Data available in March 2005 indicate that there currently are no operating turbines within SGPAs. Several sites currently under review for wind energy development in Idaho have the potential to impact sage-grouse, including Brown's Bench (Jarbidge SGPA), Danskin Mountain (Mountain Home SGPA), Glenn's Ferry (Mountain Home/West Magic Valley) and Cotterel Mountain (South Magic Valley SGPA). Other sites may be identified in the future.

The effects of wind energy development and associated ancillary facilities (i.e. access roads, utility corridors, transmission corridors) on sage-grouse populations are largely unknown, though a number of direct and indirect impacts have been identified. The Final BLM Programmatic Wind Energy Development EIS (USDI BLM 2005b) discusses a number of construction activities that may adversely affect wildlife (sage-grouse). These include: (1) habitat reduction, alteration or fragmentation, (2) introduction of invasive vegetation (3) injury or mortality of wildlife, (4) decrease in water quality from erosion and runoff, (5) fugitive dust, (6) noise, (7) exposure to contaminants, and (8) interference with behavioral activities. Manville (2004)

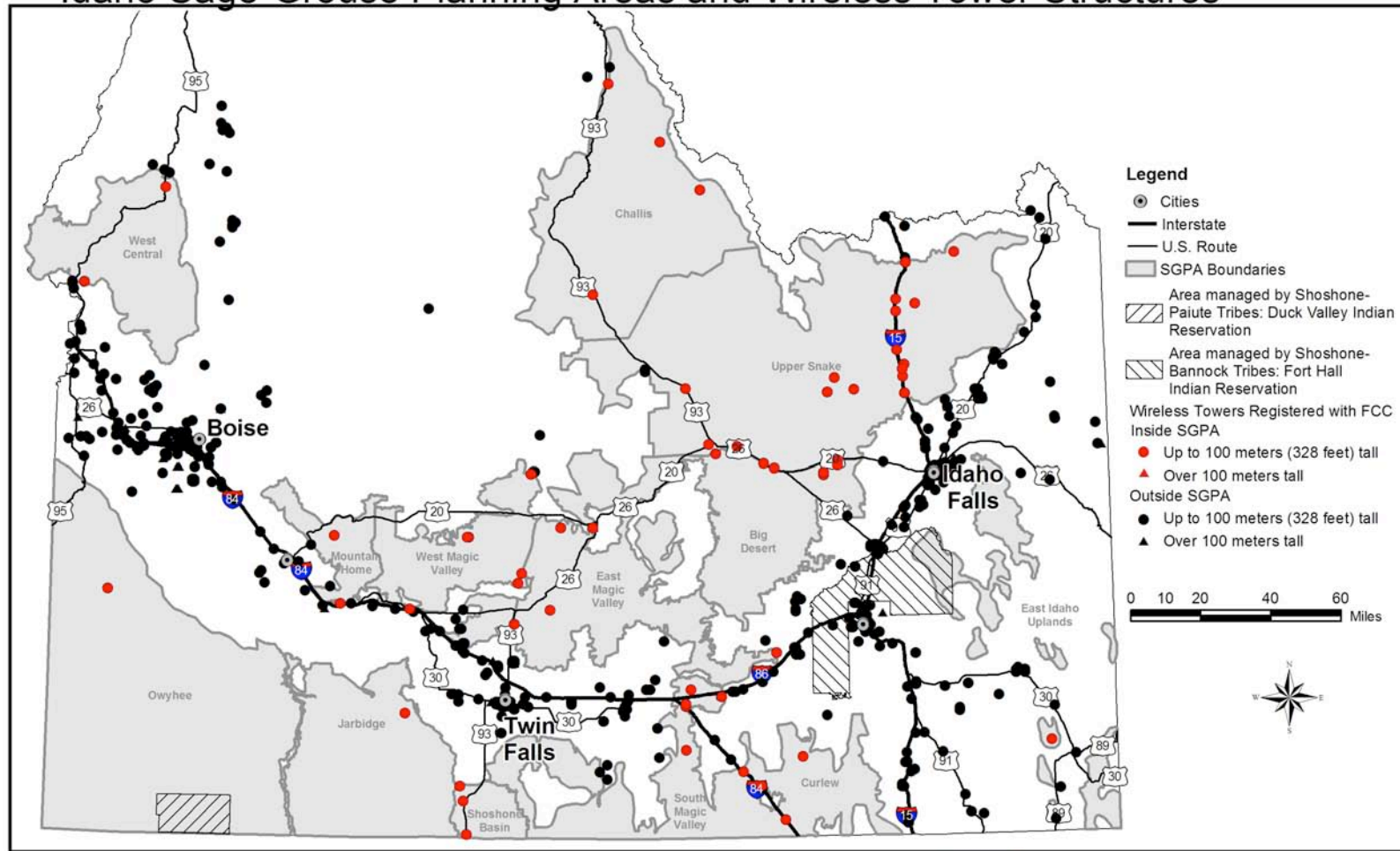
suggested, “Given the continuing uncertainties about structural impacts on prairie grouse, especially the lack of data regarding impacts from wind facilities, and the clearly declining trends in prairie grouse populations, we urge a precautionary approach by industry and recommend a 5-mile buffer [around active leks] where feasible.”

Structures can also provide potential perches and nesting substrates for raptors and ravens (Steenhof et al. 1993). Tall structures and noise associated with wind energy development may also disrupt communication between lekking birds (Manes et al. 2002). It is possible that low frequency noise and/or shadow flicker associated with turbine blades, as described in USDI BLM (2005*b*), could affect sage-grouse behaviorally, especially if in proximity to leks though further information is not available.

4.3.2.2.4 Combined linear and nonlinear infrastructure features

Figure 4-10, illustrates the extent of all six combined nonlinear and buffered linear infrastructure features on the Idaho landscape. The potential for synergistic, cumulative effects of infrastructure features on sage-grouse and sage-grouse habitat is relatively high in some SGPAs, and care should be taken in siting additional proposed projects.

Idaho Sage-Grouse Planning Areas and Wireless Tower Structures



Source of Data Layers:
 Sage-grouse Planning Areas- Idaho Fish and Game
 Wireless Towers- Berkana Wireless Radio Tower Locator
 Roads- USGS 1:100,000 Digital Line Graph
 Cities- Idaho BLM 1:500,000 corporate dataset
 Map date: February 8th, 2006

No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by BLM. No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



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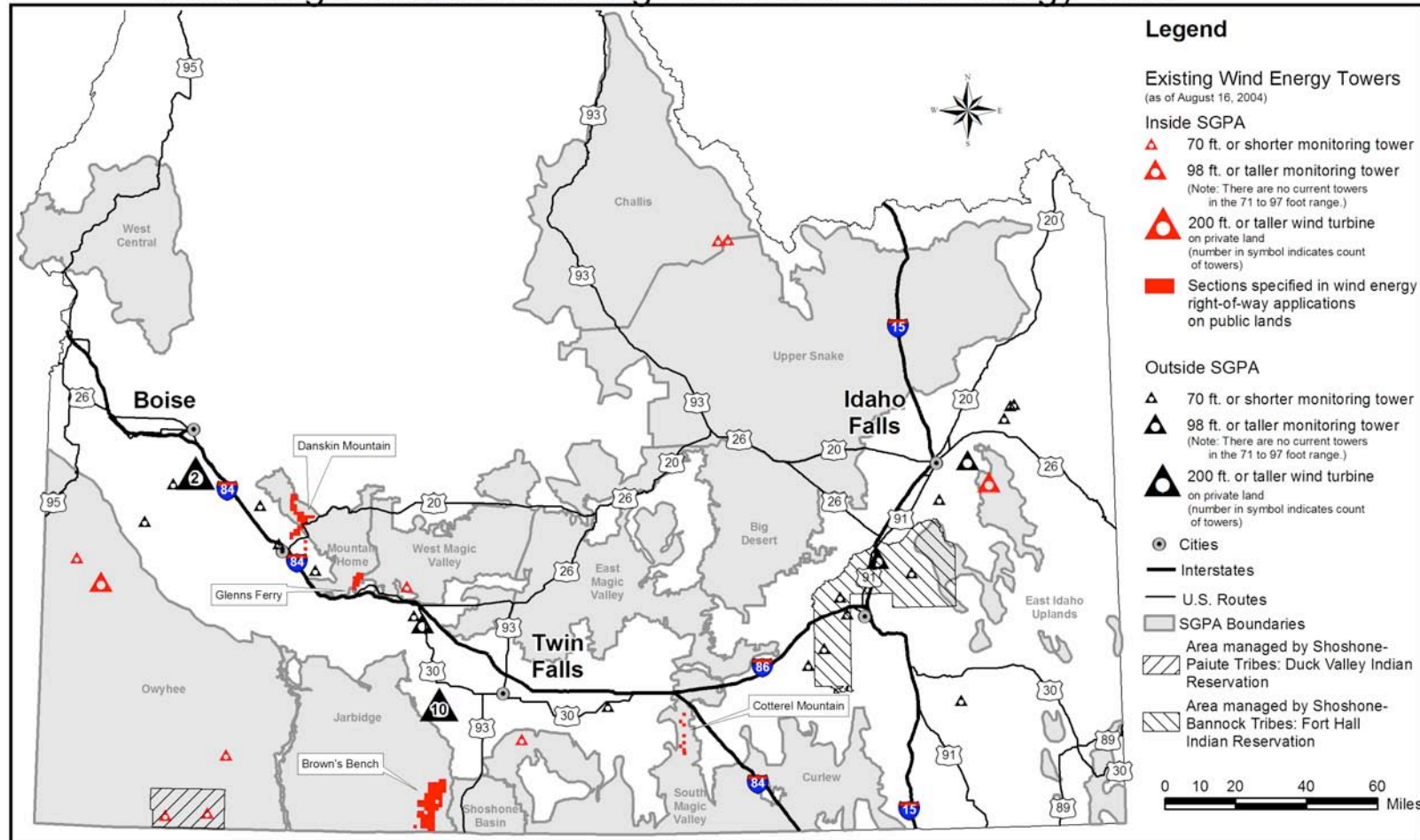
State of Idaho
 Department of Fish and Game



Figure 4-8 Idaho Sage-grouse Planning Areas and wireless communication tower structures

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Idaho Sage-Grouse Planning Areas and Wind Energy Sites



Source of Data Layers:
Sage-grouse Planning Areas: Idaho Department of Fish and Game
Wind Monitoring Tower Sites: Idaho Department of Water Resources
Wind Turbine Sites: Idaho State Office Data Steward
Wind Energy ROW Applications: Bureau of Land Management LR2000
Roads: USGS 1:100,000 Digital Line Graph (DLGs)
Cities: Idaho BLM 1:500,000 corporate dataset
Map date: February 8th, 2006

No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by BLM. No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



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Bureau of Land Management

State of Idaho
Department of Fish and Game



Figure 4-9 Idaho Sage-grouse Planning Areas and wind energy sites

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Idaho Sage-Grouse Planning Areas and Combined Infrastructure Threats

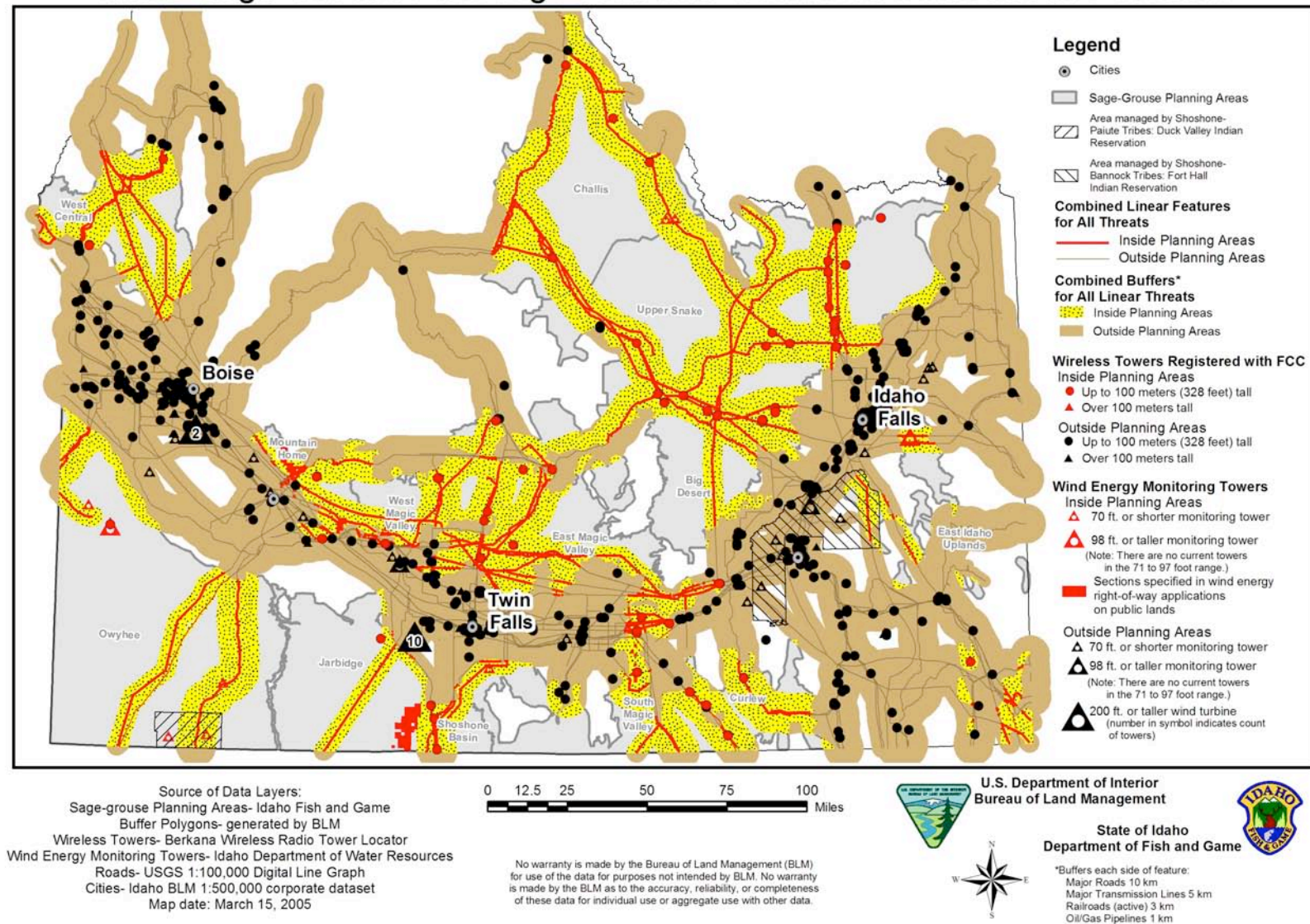


Figure 4-10 Idaho Sage-grouse Planning Areas and combined infrastructure threats

4.3.2.3 Infrastructure conservation measures

Goal: Reduce, minimize, or mitigate adverse impact to sage-grouse populations and habitat through careful planning, design, maintenance and/or modification of infrastructure features.

Issue Addressed	Rationale	Conservation Measure(s)
All infrastructure issues, disturbance to leks.	Human disturbance resulting from construction and maintenance activities can adversely affect breeding sage-grouse.	1. Inspections, maintenance work, and related human activities at or near (1 km or 0.6 miles) occupied leks that results in, or will likely result in, disturbance to lekking birds should be avoided from approximately 6:00 PM to 9:00 AM ²⁴ . Utility companies should work closely with IDFG, land management agencies and landowners in scheduling such activities to minimize disturbance. In general, this guideline should be applied from approximately March 15 to May 1, in lower elevations; and March 25 to May 15, in higher elevations.
Utility lines, communications towers, and related facilities.	Improper placement of utility lines, wireless towers or related structures can disrupt sage-grouse behavior, increase mortality due to collisions, lead to increased avian predation, or spread of invasive vegetation.	<ol style="list-style-type: none"> 1. Use of guy-wires on towers should be avoided. 2. Where existing utility lines, including smaller power distribution lines, telephone lines, or wireless communication towers are known to be causing adverse impacts locally, or where such impacts are likely, LWGs and/or land-management agencies should work closely with power companies and related entities in assessing problem areas and developing creative solutions. 3. New above ground major power transmission lines should be sited in a manner that avoids sage-grouse habitat to the extent possible, or they should be buried. 4. New, smaller power distribution lines, or similar structures (e.g., telephone lines, communications towers) should be buried (as appropriate) or sited as far as possible, preferably at least 3.2 km (~2 miles) from occupied leks and other important sage-grouse seasonal habitats (Connelly et al. 2000a), as determined locally. 5. The placement of raptor perch deterrents on power poles and other structures, such as telephone poles, should be considered on a site-specific basis in areas where population impacts from raptors or ravens is likely or is a documented problem. Areas that may be of particular

²⁴ Timeframe is from Washington State sage-grouse recovery plan. Also, concept is also presented in Connelly et al. 2000b.

Issue Addressed	Rationale	Conservation Measure(s)
		<p>concern include fragmented habitats with high raptor and/or raven activity. See “Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996” (APLIC 1996).</p> <p>6. Utility companies should ensure access roads, rights-of-ways and disturbed areas associated with their facilities are managed in a manner that restores disturbed areas to perennial vegetative cover, and controls the spread of noxious weeds and invasive plant species. Coordinate with land-management agencies and others in selecting the most appropriate plant species. Consider the use of fire-resistant species in high fire-frequency/ cheatgrass areas. Encourage companies to participate in Coordinated Weed Management Areas. LWGs may be of assistance in helping to identify particular problem areas.</p>
Major roads	Roads can result in adverse direct and indirect effects on sage-grouse and habitat including: collisions with vehicles; human disturbance and vehicular noise; habitat loss and fragmentation; increased risk of fire, and invasives.	<p>1. Ensure that new public trails, roads, and highways avoid or skirt areas of key or stronghold habitat (including restoration areas intended to become key/stronghold in the future) to the extent feasible.</p> <p>2. LWGs should identify specific roads or road sections where sage-grouse mortality has been documented. Work collaboratively with the appropriate agency(s) to develop measures to reduce the risk of road-related mortalities of sage-grouse. Consider speed limits, brush control, signing, and public education.</p> <p>3. Reduce the risk of vehicle or human-caused wildfires, and spread of invasives, by planting perennial vegetation (e.g. green-strips) paralleling road rights-of-way. This measure is applicable to existing as well as new paved or gravel roads in sage-grouse habitat. The need for the green-strips should be evaluated on a case-by-case basis depending on fire risk, vehicle activity, vegetation type, importance of the area, or other factors. Avoid the use of species palatable to sage-grouse.</p> <p>4. Manage existing roads and trails to minimize disturbance to occupied leks or other important seasonal habitats. Employ seasonal closures, permanent closures, rerouting of existing roads/trails or other measures, as deemed locally appropriate.</p>

Issue Addressed	Rationale	Conservation Measure(s)
Active railroads	Disturbed areas along railroads can facilitate the establishment and spread of invasive plants. Certain invasives (e.g., cheatgrass) increase the likelihood of wildfire ignitions from trains.	<ol style="list-style-type: none"> 1. Railroad companies should work closely with agencies and private landowners, as appropriate, to reduce or control invasive plants along railroad rights-of way, 2. Railroad companies should work closely with agencies and private landowners to manage fuels along railroad rights-of-way to reduce fire risk. Where cheatgrass or other vegetation along rights-of-way presents a high-fire risk, replace with suitable perennial species.
Gas and Oil Pipelines	Oil/gas pipeline construction can fragment habitat and facilitate the spread of invasive plants.	<ol style="list-style-type: none"> 1. Locate new oil or gas pipelines and related facilities as far as possible, preferably at least 3.2 km (approximately 2 mi) from occupied leks or place along existing corridors to the extent possible. LWGs and/or land-management agencies should work closely with gas/oil companies and related entities in identifying potential problem areas and creative solutions. 2. Oil/gas companies should work closely with agencies and private landowners, as appropriate, to reduce or control invasive plants along pipeline rights-of-way and access roads. This should include ensuring that disturbed areas are seeded to an appropriate perennial seed mix.
Wind Energy Development	Wind energy development involves an array of potential direct and indirect adverse impacts to sage-grouse and sage-grouse habitat.	<ol style="list-style-type: none"> 1. Due to the complexity of wind energy development and related support facilities, we refer the reader to USDI BLM (2005<i>b</i>) and USDI FWS (2003) for a more comprehensive list of mitigation measures and site evaluation guidelines. Key conservation measures recommended for Idaho include: <ul style="list-style-type: none"> A. Wind energy project and design approval should focus on avoiding, minimizing, or restoring habitat degradation (on-site mitigation). Consider one or more of the following specific recommendations: <ul style="list-style-type: none"> ▪ Avoid placing turbines and related infrastructure in breeding or winter habitat. If turbines must be sited within breeding habitat, avoid placing turbines within five miles of occupied leks where feasible. ▪ Avoid locating turbines and related infrastructure in known sage-grouse movement corridors, migration pathways or in areas where

Issue Addressed	Rationale	Conservation Measure(s)
		<p>sage-grouse are highly concentrated (e.g., wintering areas).</p> <ul style="list-style-type: none"> ▪ Avoid fragmenting large, contiguous tracts of sage-grouse habitat. Where practical, focus wind energy development on lands already altered or cultivated and away from areas of intact and healthy native habitats. If this is not practical, select fragmented or degraded habitats for development, rather than relatively intact areas. ▪ Minimize roads, fences, or other infrastructure. ▪ Use tubular supports with pointed tops rather than lattice supports to minimize bird (raptor, raven) perching and nesting opportunities. ▪ Avoid placing external ladders and platforms on tubular towers to minimize perching and nesting by raptors and ravens. ▪ To reduce the risk of collisions, avoid the use of guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with recommended bird deterrent devices. ▪ Where feasible, place electric power lines underground or on the surface as insulated, shielded wire to avoid electrocution (and collisions) of birds. <p>2. Measures to mitigate impacts at off-site locations should also be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.</p> <p>3. Where wind energy development within sage-grouse habitat is unavoidable, monitor sage-grouse populations and habitat (a) for at least 3 years before project construction; (b) during construction, and (c) for at least 3 years after construction is completed and implementation has begun, to complement the existing knowledge of impacts and to help in the design of future conservation measures. Industry proponents should work closely with IDFG, land-management agencies,</p>

Issue Addressed	Rationale	Conservation Measure(s)
		private landowners and LWGs, in designing the appropriate monitoring strategy.

Research, monitoring or evaluation needs: Research the avoidance distance of sage-grouse to utility lines and the incidence of, and effect of, avian predation due to utility lines. Evaluate sage-grouse response to new and existing power lines as related to habitat conditions and avian predator densities. Research/monitor the effects of wind energy development in sage-grouse habitats with respect to sage-grouse survival, habitat-use and behavior including: abandonment of leks, nesting, brood rearing or winter habitat and the distance from the wind turbines that effects are experienced. Of additional interest are the effects of low frequency noise, shadow flicker, presence of tall structures etc. Map and quantify secondary and other roads (e.g., paved county, gravel, two-tracks), smaller power distribution lines (< 138 kv), telephone lines in SGPAs. Identify specific potential problem areas. Identify utility, railroad, and road rights of way where invasive plants increase fire risk. Research or model the synergistic effects of multiple infrastructure features on sage-grouse survival, habitat use, and behavior. Document the incidence and extent of avian predation on sage-grouse nest success, and juvenile and adult survival in areas with extensive infrastructure and areas without extensive infrastructure. Evaluate sage-grouse response to new and existing power lines as associated with habitat conditions and avian predator densities.

4.3.3 Annual grassland

4.3.3.1 Threat summary and background

The proliferation of invasive annual species, particularly cheatgrass, in portions of Idaho (e.g., Wisdom et al. 2000), poses a significant threat to sage-grouse and sage-grouse habitat. Within the five-state area of Washington, Oregon, Idaho, Utah, and Nevada, cheatgrass and medusahead rye dominate or have a significant presence (>10% composition by weight) on approximately 70,000 km² (17,297,000 acres) of public land (Connelly et al. 2004). The spread of invasive annual grasses has been most extensive in the Wyoming big sagebrush cover type (Crawford et al. 2004). Risk of invasion increases below elevations of 1,500 m (4,920 ft), and is extreme below 1,000 m (3,280 ft) (Crawford et al. 2004). Exotic annual grasses do not usually dominate more mesic, cooler mountain big sagebrush or low sagebrush communities (Crawford et al. 2004). However, regardless of elevation, exotic annual grasses should be monitored closely. The competitive influence exerted by invasive annuals enables them to dominate vast areas for many years (Monsen et al. 2004). In Idaho, the majority of the Snake River Plain shows a moderate to high risk of cheatgrass displacement of sagebrush over the next 30 years (Connelly et al. 2004). For a detailed discussion on the history, ecology and risk of cheatgrass expansion, see Suring et al. (2005). While annual grasslands are the focus of this section, noxious weeds also pose a threat to sage-grouse habitat, and are discussed briefly in the Climate Change section.

4.3.3.2 Summary of key conservation issues

- **Spatial extent of annual grasslands on the landscape:** Several large areas of annual grassland are evident across southcentral, southwestern and western Idaho (Figure 4-11), and comprise nearly one million acres within SGPAs (Table 4-10). In general, these figures represent only larger areas with dominance or significant presence of annual grasslands. Smaller inclusions or areas where annuals are present but not dominant may not be well represented due to the difficulties associated with mapping habitats at the mid-scale. As mapping technologies and field inventory efforts improve, additional refinements will be incorporated. Several SGPAs show a particularly strong presence of annual grasslands. Approximately 41% of the total annual grassland acreage is in the adjacent West Magic Valley, East Magic Valley, and Big Desert SGPAs. Substantial acreages are also associated with the Owyhee, Mountain Home, and West Central SGPAs. Land ownership of identified annual grasslands is BLM (62%), BLM National Monument (3%), private (29%), and state (6%). Other ownerships constitute a negligible proportion. Given the magnitude of annual grassland acreages on the Idaho landscape, the restoration of these lands to a

point where they are again suitable for sage-grouse requires a long-term commitment of funding and personnel resources. Several research projects underway in conjunction with the Great Basin Restoration Initiative will contribute to the understanding of how to effectively restore diverse, functional rangelands. Projects include the Great Basin Native Plant Selection and Increase Project; Coordinated Intermountain Restoration Project, Integrating Weed Control and Restoration for Great Basin Rangelands Project; and A Regional Experiment to Evaluate Effects of Fire and Fire Surrogate Treatments in the Sagebrush Biome.

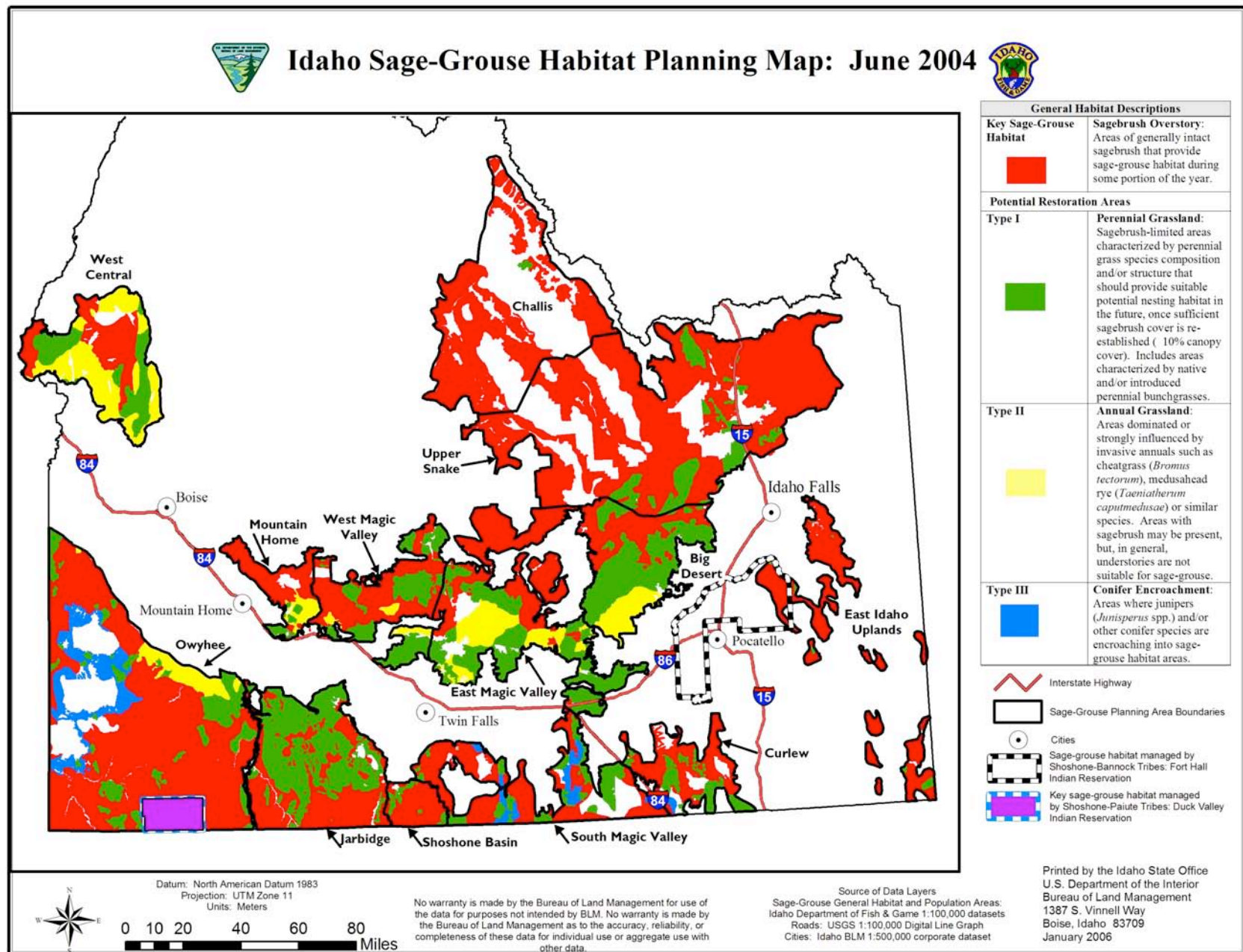


Figure 4-11 Idaho Sage-grouse Habitat Planning Map. Yellow areas indicate annual grasslands.

Table 4-10 Annual grasslands by Idaho SGPA and land-ownership status (USDI-BLM 2004a)

SGPA	Land-ownership status ²⁵										Total
	BLM	BLM NM	BIA	USFS	Other	MIL	NPS	Private	IDL	USFWS	
Big Desert	89,584	14,983	0	0	0	0	961	19,676	6,165	0	131,369
Challis	0	0	0	0	0	0	0	0	0	0	0
Curlew	0	0	0	0	0	0	0	0	0	0	0
East Idaho Uplands	0	0	0	0	0	0	0	0	0	0	0
East Magic Valley	207,028	14,729	0	0	963	0	154	4,126	10,732	0	237,732
Jarbidge	675	0	0	0	0	0	0	3	0	0	678
Mountain Home	46,837	0	0	0	0	0	0	5,979	2,476	0	55,292
Owyhee	128,628	0	0	0	0	0	0	3,153	7,846	0	139,627
Shoshone Basin	0	0	0	0	0	0	0	0	0	0	0
South Magic Valley	0	0	0	0	0	0	0	0	0	0	0
Upper Snake	0	0	0	0	0	0	0	0	0	0	0
West Central	107,120	0	0	151	0	0	0	255,399	26,333	0	389,003
West Magic Valley	38,120	0	0	0	0	0	0	3,895	2,414	0	44,429
Total	617,992	29,712	0	151	963	0	1115	292,231	55,966	0	998,130

²⁵ BLM: Bureau of Land Management; BLM NM: BLM-administered lands associated with Craters of the Moon National Monument; BIA: Bureau of Indian Affairs; USFS: U.S. Forest Service; Other: miscellaneous; MIL: Military; NPS: National Park Service; IDL: Idaho Department of Lands; USFWS: U.S. Fish and Wildlife Service. Acreages are approximate only and are reflective of the relatively broad nature of the 2004 SGHPM.

- **Degraded habitat quality including rangeland health:** In general, invasive annual grasses can proliferate and out-compete native grasses, forbs, and shrubs for nutrients and water resulting in less diverse plant communities in terms of species composition and structure. This simplified plant community structure and altered species composition (e.g., fewer shrubs or native perennial grasses and forbs, more weedy species) can degrade habitat quality and quantity by reducing the availability of desirable plant species needed by sage-grouse for cover or food.
- **Altered fuels and fire regimes:** Cheatgrass and medusahead rye can alter fire regimes by increasing fine-fuel loads and greatly shortening fire-return intervals, hindering perennial grasses, sagebrush, or other shrubs from establishing or setting seed (Laycock 1991). Dominance of sites by these annuals may result in stable, resistant vegetation states with thresholds (for recovery or restoration) that are difficult to cross (Laycock 1991). Recovery or restoration of these areas typically requires concerted management intervention.

4.3.3.3 Annual grassland conservation measures

Goal: To restore areas dominated or strongly influenced by annual grasses to a diverse mix of perennial native grasses, forbs, and shrubs, where feasible.

Issue Addressed	Rationale	Conservation Measure(s)
Spatial extent of annual grasslands on the landscape <i>AND</i> degraded habitat quality including rangeland health	Annual grasslands do not provide suitable habitat to meet the seasonal habitat needs of sage-grouse	<ol style="list-style-type: none"> 1. LWGs, land management agencies, IDFG and other partners should work closely together to identify and prioritize annual grassland areas for restoration. Work cooperatively to identify options, schedules and funding opportunities for specific projects. 2. In general, the priority for implementation of specific sage-grouse habitat restoration projects in annual grasslands should be given first to (1) sites adjacent to or surrounded by sage-grouse stronghold habitats, then (2) sites outside stronghold habitats but adjacent to or within approximately two miles of key habitat, and last (3) sites beyond two miles of key habitat. The intent here is to focus restoration outward from existing, intact habitat. 3. As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs and shrubs. Emphasize the use of native plant species recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions. Multiple treatments may be required. See Monsen et al. (2004), Dalzell (2004), and the seeded Perennial Grassland

Issue Addressed	Rationale	Conservation Measure(s)
		<p>Section 4.3.8, for helpful suggestions on restoration techniques. Lambert (2005) also provides descriptions, recommended seeding rates, and other useful information for nearly 250 species of native and non-native grasses, forbs and shrubs.</p> <ol style="list-style-type: none"> 4. The eradication or control of noxious weeds posing a risk to sage-grouse habitats should also be aggressively pursued using a variety of chemical, mechanical, biological, or other means as appropriate. All seeding project designs should include measures for noxious weed control and monitoring for at least 3 years following implementation. 5. Seed utilized in sage-grouse habitat restoration seedings, burned area rehabilitation projects, and hazardous fuels/wildland urban interface projects will be tested and certified as weed-free, based on prevailing agency policy and protocol. Private landowners are encouraged to utilize only certified seed as well. 6. To discourage the spread of invasive annuals and noxious weeds, require the use of certified weed-free forage by Permitted users (outfitters, guides, livestock operators) and by casual users (e.g., recreation trail riders, hunters) utilizing horses, goats, or llamas on public or state lands. 7. On private lands, consider enrolling in incentive or other programs to improve or enhance sage-grouse/ sagebrush habitats. Current NRCS programs that may provide some opportunities for economic offset of certain conservation measures include the Conservation Security Program (CSP), the Wildlife Habitat Incentive Program (WHIP), and the Environmental Quality Incentive Program (EQIP). Funding may also be available for certain private lands projects through BLM's hazardous fuels program or through IDFG and OSC. Landowners are encouraged to discuss the various opportunities available with their local NRCS, IDFG, or BLM office. Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund. Interested parties should contact Mr. Kent Christopher at (208) 356-0079 or grouse@fretel.com. 8. In designing rehabilitation and restoration projects, utilize the best available science relative to seeding technology and plant materials. Use of NRCS's "VegSpec" website may be helpful. VegSpec is a web-

Issue Addressed	Rationale	Conservation Measure(s)
		<p>based decision support system that assists land managers in the planning and design of vegetation establishment practices. VegSpec utilizes soil, plant, and climate data to select plant species that are site-specifically adapted, suitable for the selected practice, and appropriate for the purposes and objectives for which the planting is intended. (See http://plants.usda.gov)</p>
Altered fuels and fire regimes	Annual grasses increase the risk of fire ignition and rate of spread.	<ol style="list-style-type: none"> 1. Design vegetation treatments in areas of high fire frequency to facilitate firefighter safety; reduce the risk of extreme fire behavior; reduce the risk and rate of fire spread to stronghold, key, and restoration habitats; reduce fire frequencies; and shorten the fire season. Actions may include: fire-resistant or “green-strip” seedlings, mowing vegetation along roadsides, grazing strategies, or other related measures. 2. Where rangelands are dominated by annuals (such as cheatgrass), or border farmlands or railroad rights-of-way, convert cheatgrass areas to perennials, or establish buffers of perennial species to reduce the risk of fire spread from railroad or agriculture-related activities (e.g. sparks from trains, field burns, burn barrels), where appropriate and feasible. However, to retain their effectiveness greenstrips must be monitored as well as maintained, such as through grazing, so fuel loads do not build up over time (Younkin-Kury 2004). 3. To discourage the spread of invasive annuals and noxious weed seed, require the washing of fire vehicles (including undercarriage) prior to deployments and prior to demobilization from wildfire incidents. 4. Ensure annual grass restoration priority areas are incorporated into FMPs, updated annually, as priority fuels treatment and ESR project areas.

Research, monitoring or evaluation needs: Cooperate with the Great Basin Restoration Initiative, universities, local partners and others, as appropriate, in researching new plant materials and restoration methods. Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

4.3.4 Livestock impacts

4.3.4.1 Threat summary and background

Livestock grazing occurs on the vast majority of sagebrush lands range-wide (Knick et al. 2003, Connelly et al. 2004); however, there is little information directly linking livestock management practices to sage-grouse population levels (Braun 1987, Connelly and Braun 1997, Mosley 2001). Beck and Mitchell (2000) discuss various direct and indirect effects of livestock on sage-grouse. Only a few studies have addressed the impacts of livestock grazing on habitat use by sage-grouse (Crawford et al. 2004). Experimental research related to the impacts of specific grazing practices on sage-grouse habitat quality and sage-grouse productivity is warranted. Research currently underway in Idaho will help refine our understanding of sage-grouse nesting habitat in various areas across the state.

Historically, poor livestock grazing practices have negatively impacted some sage-grouse habitat. These impacts have included changes to the proportion of the shrub, grass, and forb functional groups; increased opportunities for invasion and dominance of introduced annuals; shortening of the growing season (e.g., through a shift from perennials which stay green longer into the growing season- toward annuals which go to seed and desiccate early in the growing season); and in some cases an overall decline in site potential through loss of topsoil (Miller and Eddleman 2001).

Connelly et al. (2004) suggested the impacts of livestock are spread unevenly across the landscape in space and time and may positively or negatively affect the structure and composition of sage-grouse habitat. In general, livestock management practices that promote the sustainability of desired native perennial grasses and forbs should maintain or minimally impact sage-grouse habitat. Miller and Eddleman (2001) summarized the inherent complexities of developing grazing management plans that are compatible with sage-grouse:

Grazing management practices, which maintain the integrity of sagebrush communities, can have positive, neutral or negative impacts on sage-grouse habitat. Season, duration, distribution, intensity of use, and class of livestock (e.g. cattle, sheep, etc.) will determine the effects of grazing on sage-grouse food and cover. Plant composition and structure at the community and landscape levels will also affect potential interactions between livestock and sage-grouse. Spatial and temporal heterogeneity of the landscape will affect abundance and grazing distribution. Topography, size and shape of pastures, and distribution of salt and water will also influence grazing distribution. All of these factors must be considered when developing grazing management plans sensitive to sage-grouse habitat requirements.

In situations where the current vegetation community controls successional pathways (e.g., cheatgrass-dominated areas), it can be expected that changes in livestock grazing management strategies or even the complete removal of grazing activity will not result in the improvement of some ecological states. Seral or post-settlement juniper stands or dense canopies of sagebrush that suppress both the shrub and herbaceous understory will not change in the short term without human intervention to restore or mimic historic disturbance regimes (e.g., wildfire). In such cases, the use of vegetation management tools including prescribed fire, mechanical removal, thinning, or other means will be necessary. Similarly, annual grasslands, often perpetuated by frequent wildfires in the more arid Wyoming big sagebrush ecological sites, are a stable state that typically require significant and often long-term human intervention to effect restoration. This intervention often requires the application of herbicides or other treatments to reduce or eliminate annuals, followed by the seeding of desired perennial species. While subsequent changes in livestock management may be appropriate to nurture and maintain the restored area, such changes alone in the absence of restoration activities would likely provide little if any progress.

In some arid areas of the west, measurable improvement of upland herbaceous vegetative conditions is a difficult process and represents a long-term management commitment. Due to the difficulty of restoring desirable vegetative conditions, the importance of maintaining currently good sage-grouse habitat is especially vital. For this reason, a primary management objective in these areas should be to maintain the condition and geographical range of currently suitable sage-grouse habitat and sagebrush communities.

As a general approach, healthy, functioning rangelands provide most, if not all, of the habitat components comprising suitable sage-grouse habitat relative to site potential. Therefore, the primary focus for conservation and improvement of sage-grouse habitat is consistent with long-term grazing management programs that support ecological conditions or trends toward healthy rangelands. Livestock management practices are not stand-alone actions but are considered in combinations that best represent a complete and effective grazing program that fully considers key sage-grouse conservation needs.

4.3.4.2 Summary of key conservation issues

The many variables associated with livestock related impacts to sage-grouse populations and habitat are complex and often interrelated. Historically, livestock over-stocking on some rangelands in the West altered the composition and productivity of some sagebrush and vegetative communities. However, implementation of improved grazing management practices including control of the timing, intensity, duration and frequency of grazing use, as well as the sequence of these treatments over time, have improved

vegetative conditions on many rangelands. The following summary presents some of the key livestock related conservation issues that affect sage-grouse populations and sage-grouse habitat.

- **Livestock management and rangeland health:** Rangeland health is defined as “*the degree to which the integrity of the soil and ecological processes of rangeland ecosystems are maintained*” (National Research Council, 1994). In general, healthy rangelands can also provide a basic foundation for productive sage-grouse habitat. Rangelands in an unhealthy or declining condition due to improper livestock management (and possibly a combination of additional factors) may have lost, or are at risk of losing, key habitat components such as desirable perennial bunchgrasses and forbs.

Idaho BLM, which has management responsibility for approximately 60% of sage-grouse habitat in the state, is in the process of evaluating rangeland health on each grazing allotment. As of the 2004 field season, Idaho BLM had completed evaluations of approximately 63% of its lands with the remaining 37% scheduled for completion in the next several years.

Of 7,381,769 acres of Idaho BLM lands assessed (note: these lands are not exclusively sage-grouse habitat) between the 1999 field season and September 30, 2004, approximately 36% constituted lands that met all Idaho BLM standards or were making significant progress toward meeting standards (USDI-BLM 2004j Idaho Annual Rangeland Report). Another 47% of the acreage assessed during that timeframe was determined as not meeting all standards due to livestock grazing, or making significant progress at the time, however, appropriate action has been taken to ensure significant progress toward meeting the standards. Seven percent of the lands assessed were categorized as not meeting standards, and livestock is a significant factor, but actions needed to ensure significant progress towards meeting the standard(s) are pending implementation prior to the next grazing season. Ten percent of the area assessed did not meet all standards, or were not making significant progress toward meeting standards, however this was due to factors other than livestock grazing. Approximately 4,424,073 Idaho BLM acres have not yet been assessed.

- **Livestock management and herbaceous plant canopy cover:** Grass height and cover have been identified as two important components of sage-grouse nest sites (Connelly et al. 2000b). For example, in the Big Desert of southeastern Idaho, Wakkenen (1990) reported taller grasses occurred near nests compared to random locations. In southwestern Idaho’s Owyhee County, Wik (2002) reported that successful nests had taller grass than did random plots. Such herbaceous cover may provide scent, visual, and physical barriers to potential predators (DeLong et

al. 1995). In Idaho, overall sage-grouse nest success is not considered a widespread problem averaging over 49% (Connelly et al. 2004).

The degree of impact that livestock grazing has on herbaceous cover, in the context of sage-grouse breeding habitat conditions is dependant on timing, intensity of use, vegetation composition, and other factors.

- **Livestock management and leks:** The practice of bedding and herding domestic sheep on or near occupied leks may pose a threat, although at this time the threat has not been quantified in Idaho. Also, the presence of sheep bands on or near leks during lek surveys, has been observed across the state and can interfere with sage-grouse breeding activities as well as hinder population monitoring efforts. Concentrations of sheep and the associated presence of herders and guard dogs in the vicinity of leks disturbs lek activity or hens nesting in the vicinity of leks (Patterson 1952).
- **Livestock management and late brood-rearing habitat:** Connelly et al. (2004) provide an extensive literature review on this topic. In general, forb diversity and cover are shown to be extremely important for sage-grouse. In Idaho, Apa (1998) found sites used by sage-grouse broods had twice as much forb cover as did independent sites. Broods in Idaho typically move up in elevation, following the gradient of food availability (Klebenow 1969). Late brood habitats are generally characterized by relatively moist conditions with succulent forbs in or adjacent to sagebrush cover (Connelly et al. 2000b). Broods also have been documented to utilize wet meadows and irrigated farmlands adjacent to sagebrush habitats (Gates 1983, Connelly et al. 1988). On the Sheldon National Wildlife Refuge in Nevada, sage-grouse used grazed meadows significantly more during late summer than ungrazed meadows because grazing had stimulated the regrowth of forbs (Evans 1986). Increased forb availability may allow hens to remain in upland brood-rearing habitats longer, which could contribute to increased chick survival due to decreased brood movements (Coggins 1998). Certain livestock management practices or poor habitat conditions that reduce the availability of forbs are of potential concern.
- **Livestock management during periods of drought:** Drought reduces vegetation productivity and water availability causing both short and potentially long-term impacts to nesting, early, and late brood habitat. In drought, forage production may be reduced by more than 50% compared to the annual average (Holechek et al. 2004). Therefore, during drought, the impacts of livestock grazing on upland herbaceous cover may be greater than usual due to already reduced vegetative productivity. Impacts to springs, seeps, and riparian habitats may also increase due to concentrations of livestock. Inadequate management of livestock during drought may also hinder post-drought recovery of upland

perennial plants since root reserves may be limited. Post-drought management is also important to facilitate recovery of drought-stressed plants.

- **Placement of salt and mineral supplements:** The placement of salt and supplements may positively or negatively affect sage-grouse and sage-grouse habitat. Supplements and salt are regularly used to improve livestock distribution. Associated ground disturbances, however, can in some cases negatively impair nearby nesting habitat quality, or create opportunities for the establishment of invasive plants.
- **Placement of fences and other structures:** Sage-grouse are adapted to landscapes with few vertical obstructions or features but currently inhabit areas with many miles of fence (Connelly et al. 2004). Fences can influence predator movements or facilitate the spread of exotic plants (Connelly et al. 2004). Fences and other structures can also pose a hazard to sage-grouse, as they can provide perch sites (posts) for raptors, or grouse may be injured or killed as a result of collisions with wires (Connelly et al. 2004). Fences in proximity to occupied leks or other important habitats or that bisect movement corridors (e.g., low areas or passes used during migratory movements) may be of particular concern.

While fences pose some potential threat, they are often useful in the development and implementation of grazing management programs intended to achieve overall improvement of sage-grouse habitats. In grazed areas, fences may be used to enhance late brood habitat through exclusion of spring sources and creation of riparian pastures where grazing use can be more carefully controlled. Since the impact of individual fences has not been quantified, grazing managers should consider new or existing fences on a site-specific basis relative to sage-grouse.

- **Design and placement of water developments:** Water developments and the distribution of water sources substantially influence the movements and distribution of livestock in arid western habitats (Valentine 1947, Freilich et al. 2003). Consequently, water developments, depending on their placement and design, can increase or decrease the impact of livestock on sage-grouse habitat.

Water developments pose a potential threat if troughs or tanks are not equipped with wildlife access and escape ramps to prevent sage-grouse from drowning. Spring developments can disrupt or diminish the free flow of water if not designed properly, adversely affecting wet meadows or other moist areas used by foraging grouse (Connelly et al. 2000b).

Diminished water flows may also reduce available surface water for drinking, though the importance of this issue has been questioned. While some have suggested that access to water may also be important (Girard 1937, June 1963,

Goebel 1980, Hanf et al. 1994 cited in Schroeder et al. 1999), others have contended that succulent vegetation may provide sufficient moisture (Batterson and Morse 1948, Trueblood 1954, Nelson 1955, Wallestad 1971, 1975).

Therefore, water developments in sage-grouse habitat should be carefully analyzed and designed to accommodate the needs of grouse, as well as to facilitate sound grazing systems. Water storage and conservation practices should be used to promote and retain the wetland characteristics of associated springs and other water sources.

- Livestock management during rehabilitation and restoration efforts:**
 Substantial areas of Idaho are undergoing, or are in need of, restorative efforts to replace annual grasslands with desirable perennial grasses, forbs, and shrubs. It may also be desirable to diversify certain existing exotic perennial grass seedings (e.g., crested wheatgrass) by increasing the shrub, forb or perennial grass component or by conversion to a mix of native grasses and forbs. There are currently insufficient alternative forage reserves to support large restoration efforts during recovery periods. Therefore, forage reserves, economic incentives, or similar measures to help livestock operations remain viable while newly seeded areas are treated and rested from use will be necessary. These measures could also be used to facilitate other resource objectives such as riparian recovery or to provide rest to improve herbaceous cover in certain nesting or brood habitat areas.

In addition, rest-requirements associated with burned area fire rehabilitation seedings often require livestock operators to seek forage elsewhere if alternative forage or other options are not available. Currently, the availability of forage reserves in Idaho is extremely limited. Without the development of additional reserves, economic incentives, or other processes, the restoration of Idaho’s annual grasslands and diversification of exotic perennial grass seedings will proceed slowly, and both operators and sage-grouse will continue to remain at risk of wildfires and their associated after-effects.

4.3.4.3 Livestock impact conservation measures

Goal: Manage grazing to maintain soil conditions and ecological processes necessary to protect and maintain properly functioning sagebrush communities that meet the long-term needs of sage-grouse and other sagebrush associated species.

Issue Addressed	Rationale	Conservation Measure(s)
Livestock management and rangeland health	Some livestock management practices impair	1. Use established scientifically based agency protocols and procedures for evaluating rangeland health and sage-grouse habitats.

Issue Addressed	Rationale	Conservation Measure(s)
	rangeland health.	<ol style="list-style-type: none"> <li data-bbox="776 258 1429 380">2. Establish specific habitat objectives and implement effective grazing management practices and/or vegetative manipulation to achieve those objectives and maintain or improve vegetation conditions or trends. <li data-bbox="776 411 1429 474">3. Provide private landowners with incentives when and where appropriate to achieve sage-grouse objectives.
Livestock management and herbaceous plant canopy cover	In some cases, livestock grazing may reduce the availability of suitable nesting or early brood-rearing habitat.	<ol style="list-style-type: none"> <li data-bbox="776 510 1429 930">1. If fine-scale habitat assessments or monitoring indicates that current livestock grazing practices are limiting sage-grouse nesting habitat quality and/or quantity (see Chapter 5) and/or reproductive success by limiting herbaceous understory characteristics - design and implement grazing management systems that maintain or enhance herbaceous understory cover, height, and species diversity that occurs during the spring nesting season. Grazing systems must be consistent with ecological site characteristics and potential. The primary objective is to provide desirable perennial grass and perennial forb cover during the spring nesting season (approximately April 1-June 15 in much of Idaho, see Chapter 5 for additional discussion). Design management programs to minimize grazing effects on the cover and height of primary forage species in occupied habitat during the nesting season. The following is a list of management actions or strategies that should be considered and employed singly or in combination, where appropriate, in the development and implementation of grazing management programs: <ol style="list-style-type: none"> <li data-bbox="824 1266 1421 1329">A. Reduce stocking rates or rest breeding habitat areas where appropriate. <li data-bbox="824 1360 1421 1455">B. If the area is lacking or deficient in herbaceous cover, reduce livestock utilization, immediately prior to and during, the nesting season. <li data-bbox="824 1486 1421 1581">C. Employ grazing management systems that ensure adequate nesting habitat within the breeding landscape. <li data-bbox="824 1612 1421 1747">D. When use pattern mapping or monitoring shows opportunity to adjust grazing use distribution to benefit occupied sage-grouse breeding habitat, include as appropriate herding, salting and water source management (e.g., turning troughs/pipelines

Issue Addressed	Rationale	Conservation Measure(s)
		<p>on/off, extending pipelines/moving troughs) in grazing management programs.</p> <p>E. When available and feasible, utilize exotic perennial grass seedings and/or annual grasslands to avoid breeding season use of occupied sage-grouse habitat.</p> <p>F. When alternative forage is available and/or other incentives can facilitate changes, delay spring turnout to reduce grazing use of occupied breeding habitat.</p> <p>G. Use NRCS incentive programs as related to private lands and sage-grouse/sagebrush habitats. Current programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist.</p> <p>H. Develop strategically located forage reserves (seedings) to shift early season livestock-use. (Note: the establishment of such forage reserves may be particularly relevant in areas that have minimal or no potential for sage-grouse habitat restoration.)</p> <p>I. Where circumstances allow (e.g., existence of suitable alternate spring grazing sites, specific livestock management schemes, economic incentives, etc.) consider eliminating spring grazing in sage-grouse habitat.</p> <p>J. Permanently exclude livestock from certain important sage-grouse nesting areas through fencing (i.e., to protect native ranges within exotic seedings).</p> <p>K. Where appropriate maintain residual herbaceous vegetation at the end of the grazing season to contribute to nesting and brood-rearing habitat during the coming nesting season.</p>
Livestock management and leks.	Bedding of sheep bands on or near leks can disturb breeding grouse and interfere	<p>1. Use lek route or other relevant information to identify leks where the placement of sheep camps, bed grounds, herding or related activities is repeatedly disturbing displaying birds on active leks. Dates of concern are from March 15 through May 1 in lower elevation</p>

Issue Addressed	Rationale	Conservation Measure(s)
	with lek/ population monitoring.	<p>habitats and March 25 through May 15 in higher elevation habitats. Once such leks are identified, land management agencies should work closely with sheep ranchers, LWGs and the IDFG to identify mutually agreed upon alternative sites or herding routes that eliminate or reduce disturbance. In selecting such alternative sites/routes, focus on areas away from leks and that do not provide breeding habitat characteristics, where feasible. If such lek-specific conservation measures cannot be developed (due to time or logistical constraints), domestic sheep grazing activities described above will be avoided within the lesser of 0.5 mile or direct line of sight of any such lek during the lekking periods.</p> <p>2. Ensure that sheep operators and herders are aware of the location of occupied leks. Show operators/herders these locations in the field, provide maps, or mark the perimeter of occupied leks, etc. as appropriate).</p>
Livestock management and late brood-rearing habitat.	Livestock grazing may reduce the availability of suitable late brood-rearing habitat.	<p>1. Due to the preference of forbs by domestic sheep, manage sheep allotments using grazing management techniques that promote and maintain a diversity of desirable annual and perennial forbs. Suggestions include:</p> <ul style="list-style-type: none"> A. Alternate or rotate areas for spring turnout. B. Promote light, once-over use of vegetation, as opposed to repeated use during the same season by the same band or successive bands of sheep. C. Ensure that permittees, foremen, herders and sheep camp tenders are informed of management and movement requirements, such as related to the avoidance of recent burns, burned area rehabilitation seedings or other restoration sites. D. Employ open (loose) herding of sheep as opposed to tightly bunched sheep. <p>2. Manage grazing of riparian areas, meadows, springs, and seeps in a manner that promotes vegetation structure and composition appropriate to the site. In some cases enclosure fencing may be a viable option. However, in some cases, (e.g., enclosed meadows), the availability and quality of herbaceous species may be improved by periodic grazing use of enclosure and should be considered in the grazing management program.</p>

Issue Addressed	Rationale	Conservation Measure(s)
		<ol style="list-style-type: none"> 3. In agricultural fields where sage-grouse use has been documented or is likely, willing landowners may wish to avoid or limit use of alfalfa by livestock after the last cutting, to provide residual alfalfa for use by sage-grouse broods.
Livestock management during periods of drought.	Drought conditions can intensify the effects of livestock grazing on upland and riparian vegetation.	<ol style="list-style-type: none"> 1. In sage-grouse nesting and brood-rearing habitats, adjust livestock use (season, utilization, stocking, intensity, and/or duration) during drought to minimize the additional stress placed on herbaceous species. This is anticipated to reduce impacts on perennial herbaceous cover, plant species diversity, and plant vigor. 2. Foster the coordination of drought management activities and outreach through the Idaho Rangeland Drought Subcommittee.
Placement of salt and mineral supplements.	The placement of salt and mineral supplements can affect sage-grouse habitat quality.	<ol style="list-style-type: none"> 1. When using salt or mineral supplements: a) place them in existing disturbed sites, areas with reduced sagebrush cover, seedings, or cheatgrass sites (for example) to reduce impacts to sage-grouse breeding habitat, b) where feasible, use salts or mineral supplements to improve management of livestock for the benefit of sage-grouse habitat.
Placement of fences and other structures.	The placement of fences or other structures near important seasonal habitats can increase the risk of collision mortalities or may facilitate predation by eagles, hawks and ravens.	<ol style="list-style-type: none"> 1. Biologists, in cooperation with LWGs and willing landowners, are encouraged to use existing knowledge, allotment/pasture maps and lek distribution maps, to determine which fences may pose the greatest risk for collision mortality. 2. If sage-grouse mortality due to collision with fences is documented, or if collisions are likely to occur due to new fence placement, implement appropriate actions to mitigate impact. Such actions might include marking key sections of fences with permanent flagging or other suitable means. Field personnel and landowners should use their best judgment in determining where fence marking is required to lessen the impacts to sage-grouse. 3. Placement of new fences and structures should include consideration of their impact on sage-grouse. In general, avoid constructing new fences within 1 km (0.6 mi) of occupied leks (adopted from Connelly et al. 2000b). Where feasible, place new, taller structures such as corrals, loading facilities, water storage tanks, windmills etc., as far as possible from occupied leks to reduce opportunities for perching raptors. Careful consideration, based on local conditions, should also be given to the placement of new fences or structures near

Issue Addressed	Rationale	Conservation Measure(s)
		other important seasonal habitats (winter-use areas, movement corridors etc.) in order to reduce potential impacts.
Design and placement of water developments.	Water developments can: result in mortality of sage-grouse due to drowning; affect the flow of springs/wet meadows; foster the spread of invasive plants; or encourage grazing or disturbance of previously unused or lightly used breeding or early brood habitat.	<ol style="list-style-type: none"> 1. New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows by the use of float valves on troughs or other features where feasible. Retrofit existing water developments during normal maintenance activities. 2. Ensure that new and existing livestock troughs and open water storage tanks are fitted with ramps to facilitate the use of and escape from troughs by sage-grouse and other wildlife. Do not use floating boards or similar objects, as these are too unstable and are ineffective. See Wildlife Watering and Escape Ramps on Livestock Water Developments (Sherrets 1989) for suggestions for ramp designs. 3. When placing new water developments in sage-grouse breeding habitat, choose sites and designs that will provide the greatest enhancement for sage-grouse and sage-grouse habitat. 4. Avoid placing water developments into higher quality native breeding/early brood habitats that have not had significant prior grazing use.
Management of livestock during rehabilitation and restoration efforts.	The practicality of extensive rangeland rehabilitation and restoration efforts is dependent upon adequate plant establishment time (rest) before grazing resumes.	<ol style="list-style-type: none"> 1. Identify and when feasible, establish strategically located forage reserves focusing on areas unsuitable for sage-grouse habitat restoration, or lower priority habitat restoration areas. These reserves (such as seedings) would serve to provide livestock operators with temporary alternative forage opportunities during the resting of recently seeded restoration or fire rehabilitation areas and could serve as additional fuel breaks depending on location and configuration²⁶. 2. Identify and utilize economic incentive programs to assist private landowners in implementation of appropriate sage-grouse habitat conservation actions on private lands.

²⁶ This concept may be particularly relevant in portions of Idaho where large-scale restoration efforts are anticipated (e.g., East Magic Valley, Big Desert).

Research, monitoring or evaluation needs: Research is needed to better understand the impacts of livestock management (systems and individual practices) on sage-grouse populations, and habitat. Monitoring and evaluation is also necessary to better identify and determine the impacts of current grazing management practices on sage-grouse populations, and habitat. Document the extent of sage-grouse collision with fences and conduct effectiveness monitoring of flagged or tagged fences.

4.3.5 Human disturbance

4.3.5.1 Threat summary and background

Human disturbance encompasses several distinct issues, for which varying levels of concern have been expressed. Off-highway vehicle (OHV) use has increased dramatically in recent years, and there is considerable concern about the potential for disturbance to sage-grouse on leks or other important seasonal habitats, ground disturbance, spread of invasive plants, and increased fire risk. Military training activities, while they may be necessary in the interest of national defense are nonetheless a potential source of disturbance.

Project construction and maintenance activities near leks are also matters of concern, and encompass a host of activities associated with other potential threats such as infrastructure, mines and gravel pits. Human activities associated with management of cattle or sheep on or near occupied leks may also cause disturbances under some circumstances. Finally, wildlife viewing and photography, while an important aspect of public education and nonconsumptive use, nonetheless can result in disturbance to lekking birds. In general, when humans approach occupied leks, grouse often flush and may or may not return the same day (Call 1979).

4.3.5.2 Summary of key conservation issues

- **Off-highway vehicle (OHV) disturbance:** Off-road vehicles, including four wheel drives, all terrain vehicles (ATV) and motorcycles can potentially disturb sage-grouse activity at leks and threaten other important seasonal habitats (nesting, brood-rearing, fall/winter). Examples of specific impacts include: increased human presence, noise, ground disturbance, spread of weed seeds, direct damage to sagebrush plants and other vegetation, and risk of human-caused wildfire. In some areas, OHVs are used extensively to search cross-country for shed antlers in the spring, and adverse impacts to sage-grouse or sage-grouse habitat are likely. In some areas, mountain biking may also pose a potential disturbance during lekking and nesting periods.

The use of certain types of OHVs in Idaho is increasing dramatically, statewide (Figure 4-12). Although, some of this increase may be due to improved compliance with registration (Idaho Department of Parks and Recreation 2004). Idaho Department of Parks and Recreation (IDPR) statistics for southwest, southcentral, southeast and eastern Idaho, representing portions of the state most relevant to sage-grouse managers, indicate that motorbike and ATV registrations

overall have nearly doubled between 1999 and 2003 (Figure 4-13). Eastern Idaho exhibited the greatest increase of registrations (141.6%) during that timeframe, followed by southeast (93.2%), south-central (85.6%) and southwest (80.8%).

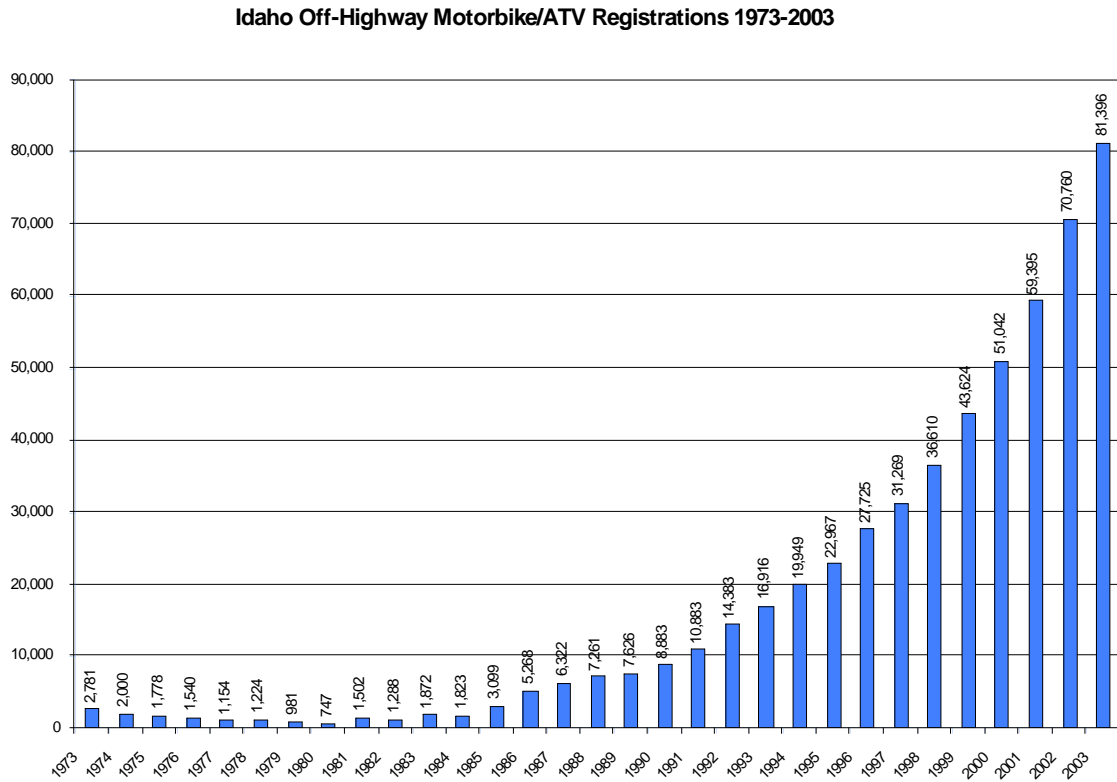


Figure 4-12 Idaho Off-Highway Motorbike/ATV Registrations 1973-2003²⁷

²⁷ Figure courtesy IDPR (2004). Numbers are not definitive, as they reflect only registered motorcycles and ATVs. Additionally, part of the increase may be due to improved compliance with registration.

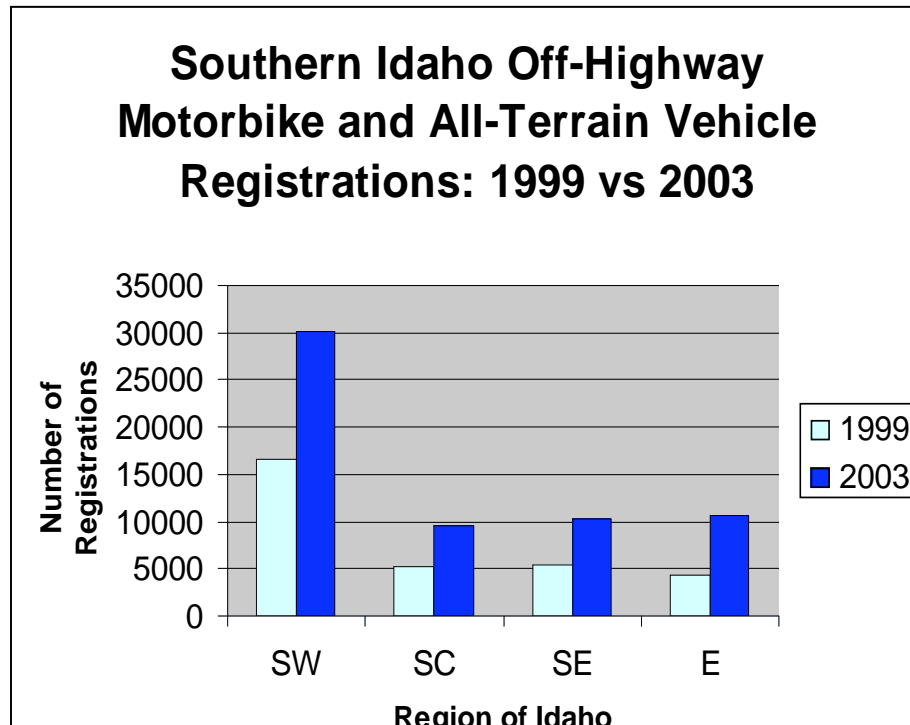


Figure 4-13 Southern Idaho ATV and Off-Highway Motorbike Registrations 1999 VS 2003²⁸

- Military training:** Many military exercises are destructive by their nature (Connelly et al. 2004). Direct impacts result from maneuvers by tracked and wheeled vehicles and from fires originating from ordnance impacts (Connelly et al. 2004). Vehicle disturbance facilitates the spread of exotic plants, increases potential for soil erosion and potentially reduces ecosystem productivity and stability (Belcher and Wilson 1989, Shaw and Diersing 1990, Watts 1998 cited in Connelly et al. 2004). Direct and indirect affects of access roads, noise and human disturbance associated with emitter sites are also of concern.

Habitat fragmentation and loss of native shrubs on broader spatial scales is also of concern. Knick and Rotenberry (1997) reported that military training activities with tracked vehicles was associated with a landscape characterized by small, closely spaced shrub patches.

²⁸ SW=Southwestern Idaho, SC=Southcentral Idaho, SE=Southeastern Idaho, E=Eastern Idaho. Southern Idaho data summarized from IDPR (2004). Numbers are not definitive, as they reflect only registered motorcycles and ATVs. Additionally, part of the increase may be due to improved compliance with registration.

In 2004, an Integrated Resources Management Plan (IRMP) was completed for the Mountain Home Air Force Base including affiliated training ranges (U.S. Air Force 2004). The IRMP, in part, addresses fish and wildlife management issues related to Mountain Home Air Force Base and affiliated training ranges including Saylor Creek, Juniper Butte and other sites. Goals include the restoration and enhancement of wildlife habitats to increase biological diversity and to avoid disturbance to special status species. Specific objectives, depending on the site, include the seeding of sagebrush and native species where practical, restoration of native or fire-resistant vegetation, control of fine fuels and weeds, fire prevention and management, off-road restrictions, consideration of seasonal restrictions and awareness training for training range users. The IRMP also commits to continued coordination with the Owyhee sage-grouse LWG. Progress is reported during annual meetings with IDFG and other cooperators.

- **Project and maintenance activity near leks:** Construction and maintenance activities associated with rangeland improvements, vegetation manipulation projects; roads, gas/oil pipelines, utilities and communication structures (see also Infrastructure 4.3.2), and other similar activities near occupied leks during the breeding season have the potential to disturb sage-grouse. The significance of the threat is a function of proximity, timing, and duration of the activity. The current level of disturbance and impacts of these factors on Idaho sage-grouse populations are unknown, but in many cases, can likely be reduced or minimized. Suggested buffers vary. Connelly et al. (2000b), in the context of human disturbance associated with energy exploration, recommended minimizing human activities within view of or <0.5 km (0.3 miles) of active leks. Stinson et al. (2004) and Utah Division of Wildlife Resources (2002) recommend a 1 km buffer.
- **Human activity associated with management of livestock:** Human activities associated with livestock management (e.g., fence construction, sheep camps, etc.), near sage-grouse leks have the potential to disturb lek activity or hens nesting in the vicinity of leks (see also Infrastructure 4.3.2 and Livestock Impacts 4.3.4).
- **Wildlife viewing/photography at leks:** The viewing and photography of sage-grouse at leks is an interest pursued by a relatively small, but in all likelihood, growing number of enthusiasts. Instances of photographers camping on leks have been noted, as has the presence of temporary blinds. Such activities disturb breeding sage-grouse. Viewing from automobiles does not appear to disrupt courtship activity, but grouse flush when people leave cars to get a closer look (Stinson et al. 2004).

4.3.5.3 Human disturbance conservation measures

Goal: To eliminate, reduce or minimize human-related disturbance to sage-grouse on important seasonal habitats.

Issue Addressed	Rationale	Conservation Measure(s)
OHV disturbance	OHV activity can disturb sage-grouse, adversely impact vegetation and soils, and increase fire risk.	<ol style="list-style-type: none"> 1. Limit OHV use to existing designated roads and trails to eliminate or minimize disturbance to sage-grouse and reduce the risk of wildfire and other habitat disturbances associated with cross-country travel. Consider a “closed unless posted open” approach where appropriate. 2. Discourage the creation of new roads and trails in sage-grouse breeding or winter habitat. Re-route existing trails and route new trails in a manner that minimizes disturbance. 3. Where existing roads or OHV trails are near occupied leks, apply use-restrictions where needed and appropriate, to minimize nonessential activity between 6:00 PM to 9:00 AM. In general this guideline should be applied from approximately March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats, where OHV or vehicular disturbance is a problem. 4. Work collaboratively with OHV user groups to increase awareness of the potential adverse impacts of OHVs on sage-grouse and other wildlife and to develop solutions to reduce conflict.
Military training	Military training activities can disrupt sage-grouse, lead to fires and habitat fragmentation, increase invasives and human disturbance.	<ol style="list-style-type: none"> 1. Continue cooperating with the military (e.g., Mountain Home Air Force Base Integrated Resources Management Plan) in designing and improving measures to reduce or mitigate the effects of military training activities on sage-grouse and sage-grouse habitat. 2. Foster further communication and collaboration between the military, land management agencies and landowners via the Idaho Sage-grouse Advisory Committee and Local Working Groups. Utilize such partnerships to more effectively plan resource management and protection activities on a landscape basis.
Projects and maintenance activity near leks	Human disturbance can cause disruption of breeding or nesting sage-	<ol style="list-style-type: none"> 1. Human activities such as fence and pipeline maintenance or construction, facility maintenance, utility maintenance, or any project or related work at or near (1 km or 0.6 miles) occupied leks that results in or will likely result in disturbance to lekking birds should be

	grouse.	avoided from approximately 6:00 PM to 9:00 AM. In general this guideline should be applied from approximately March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats.
Human activity associated with management of livestock	Human activities associated with livestock management near sage-grouse leks has the potential to disturb lek activity or hens nesting in the vicinity of leks	<ol style="list-style-type: none"> 1. Avoid creating unnecessary disturbances related to livestock management activities near occupied leks whenever possible (see also Livestock Impacts Section 4.3.4). 2. Sheep camps and related issues. Please see Livestock management and leks Conservation Measure No. 1 in the Livestock Impacts section.
Wildlife appreciation, viewing, and photography at leks	Careless or imprudent activities associated with viewing of sage-grouse at leks can lead to disturbance of breeding sage-grouse.	<ol style="list-style-type: none"> 1. Wildlife viewing and appreciation should be promoted; however, the viewing of sage-grouse on leks should be conducted so that disturbance to birds is minimized or eliminated. Use of blinds for photography at leks should be limited to the latter part of the lekking season, outside of peak breeding activity, as determined locally. 2. Where photography or viewing activities appear to be increasing in extent, or if they appear to be problematic in certain areas, consider designating 1-3 lek locations for public viewing. Other alternatives might include establishing one or more seasonal blinds for public use, utilize agency staff or trained volunteers to guide viewers to selected leks during designated times, and limit close-up viewing/photography of selected leks to the latter portion of the breeding season after most breeding has occurred. 3. Camping on occupied leks should not be allowed, to eliminate sustained disturbance. 4. Improve the dissemination of information to elementary and high school students, hunters, resource user-groups, and others to increase their understanding of sage-grouse and sagebrush steppe conservation issues. 5. Monitoring of leks should be done in a manner that minimizes disturbance to sage-grouse. Follow the established protocol described in Section 5.2.1.1 and 5.2.1.2.

Research, monitoring or evaluation needs: Evaluation is needed to document areas where general recreation, and especially OHV activity may be causing unacceptable disturbances to leks or damage to important seasonal habitats and to aid in the planning or zoning of trails and closure restrictions. Coordination with the Rangewide Conservation Strategy team in developing or refining suggested disturbance buffers is recommended. In addition, there is a need to identify and map areas where potential conflicts may be occurring with human activities related to sheep bedding and leks.

4.3.6 West Nile Virus

4.3.6.1 Threat summary and background

Between 1999 and 2005, 284 species of birds were reported to the Centers for Disease Control and Prevention (CDC) West Nile Virus (WNV) avian mortality database including greater sage-grouse (Centers for Disease Control and Prevention 2005). The disease appears to be spread primarily by mosquitoes (see detailed discussion in Connelly et al. 2004). The virus was first documented on the east coast of the United States in 1999 and has rapidly spread westward (Naugle et al. 2004a). Water that persists into late summer in dry landscapes may attract sage-grouse and expose them to insects that carry WNV, however the role that natural and human-constructed water sources play in the spread of WNV is unclear (Walker et al. 2004, Naugle et al. 2004b). Monitoring of radioed sage-grouse was initiated in Wyoming and Montana in 2004 to quantify the relationship between various surface water sources and WNV vectors (Walker et al. 2004).

Infected birds in the field often show a lack of mobility, tilted or drooping head or drooping wings when roosting, or weak flight when flushed (Walker et al. 2004). WNV represents a significant new stressor on sage-grouse and probably other at-risk species (Naugle et al. 2004a).

In greater sage-grouse, WNV was first detected in northeast Wyoming, eastern Montana, and southeast Alberta in summer 2003 (Naugle 2004a). In 2003 WNV reduced late-summer survival an average of 25% in four radio-marked populations in Wyoming, Montana and Alberta, Canada (Naugle et al. 2004a). Late summer survival of radio-marked female sage-grouse in the Powder River Basin of Wyoming and Montana was 76% in two sites without WNV but was only 20% at a site with confirmed WNV mortalities (Walker et al. 2004). Most sage-grouse do not appear to be able to survive WNV infection or develop immunity (Naugle et al. 2004b). However, the Wyoming State Veterinary Laboratory recently confirmed that 10% (5 of 50) of blood samples from female greater sage-grouse collected in the Powder River Basin tested positive for antibodies to WNV (D. Naugle, personal communication 8/31/05; Casper Star-Tribune 8/25/2005).

In Idaho, the first probable human case was reported in November 2003 (Idaho Department of Health and Welfare 2005). In August 2004, the first infected bird, a magpie from Gooding County, tested positive (Idaho Department of Health and Welfare 2004). Infected sage-grouse had not been detected in Idaho as of July 2005. (For additional information see <http://www.westnile.idaho.gov>).

Continued surveillance for WNV is in progress. Instructions for the handling and transport of bird carcasses for subsequent WNV testing have been provided to IDFG regions and other agencies.

4.3.6.2 Summary of key conservation issues

At present, given that there is little that can be done once sage-grouse have contracted WNV, the key conservation issues involve detection and research.

- **Need for continued surveillance for WNV:** Early detection of WNV in sage-grouse can help managers better assess risk and determine further actions (e.g., alert the public, restrict seasons, increase monitoring).
- **Need for better information concerning land management activities that reduce risk of transmission:** The effects of land management activities on WNV and its vectors is largely unknown

4.3.6.3 West Nile Virus conservation measures

Goal: Ensure that WNV is detected as early as possible.

Issue Addressed	Rationale	Conservation Measure(s)
Need for continued surveillance for WNV	Early detection of WNV in sage-grouse can help managers better assess risk and determine further actions (e.g., alert the public, restrict seasons, increase monitoring).	1. Continue cooperating with regional and state-level WNV monitoring and/or surveillance efforts.
Need for better information concerning land management activities that reduce risk of transmission	The effects of land management activities on WNV and its vectors is largely unknown	1. Cooperate with research efforts to evaluate habitat conditions that contribute to WNV and conservation measures to reduce risk. 2. Identify effective conservation measures to manage potential WNV vectors.

Research, monitoring or evaluation needs: Continued testing for immunity. Research and testing of potential conservation measures.

4.3.7 Prescribed fire

4.3.7.1 Threat summary and background

In this section, the discussion of prescribed fire and related conservation measures also encompasses other “sagebrush control” activities, such as mechanical treatments. To minimize redundancy in this plan, the choice was made to combine these discussions because: (1) certain issues related to the effects of prescribed fire and other sagebrush control techniques may be similar, such as habitat reduction and risk of invasives, and (2) management objectives may be similar. Combining the discussions, however, is not intended to imply that the risk of mechanical sagebrush control is the same as that of prescribed fire.

Prescribed fire can be used to control annual grasses, reduce sagebrush density, facilitate growth of grasses and forbs, and control juniper and pinyon expansion into sagebrush habitats (Connelly et al. 2004). For example, it can be an effective tool in reducing mountain big sagebrush cover and density and increasing herbaceous productivity on more mesic rangelands, and in reducing heavier fuel loadings in certain strategic areas. Prescribed fire may be an appropriate and necessary site-preparation technique in the restoration of poor quality habitat. For example, in cases where the removal of cheatgrass thatch is needed prior to chemical treatments and seeding; or in specific circumstances where the temporary removal of sagebrush cover (excluding winter range) is needed to facilitate drill-seeding during restoration operations. Prescribed fire is also a potential tool for maintaining forage reserves that provide alternative livestock foraging areas during restoration efforts; it may also be used in maintaining certain grass seedings that were installed previously, to help offset grazing impacts to native rangelands or riparian areas.

However, prescribed burning of sagebrush habitats also involves risk. Prescribed fires can escape under certain conditions, affecting areas beyond the planned treatment area. The recovery of burns in drier sites can be very slow, and the limited viability of sagebrush seed limits regeneration if post-burn weather conditions are unfavorable (Connelly et al. 2004). After a nine-year study on Idaho’s Big Desert, Connelly et al. (1994, 2000c) reported that prescribed burning of Wyoming big sagebrush during a drought period resulted in a large decline of a sage-grouse breeding population. In a study of twenty wildfires and prescribed fires in eastern Idaho, Nelle et al. (2000) reported mean canopy cover for mountain big sagebrush 14 years post-burn was less than half that of the unburned sites (8% vs. 18%). However, the character and scale of the burn mosaic, fire severity, spring precipitation and other factors may influence the recovery of sagebrush canopy cover to levels suitable for nesting habitat. In general, prescribed burn programs in mountain big sagebrush

should be planned to avoid creating a landscape of adjacent young burns (Nelle et al. 2000). For additional discussion of the effects of fire on sagebrush and/or sage-grouse, see the Wildfire section 4.3.1, and Chapter 2, Sagebrush Ecology.

Prescribed fire acreages and associated details are difficult to summarize statewide, due to agency variations in project documentation methods and lack of centralized reporting. Some coarse data are available however: BLM Public Land Statistics reported 93,724 acres of prescribed fire occurred on Idaho BLM lands between 1997 and 2002.²⁹ While annual acreages of prescribed fire are reported across 7 categories including forestry, range, wildlife, hazard reduction, watershed, ecosystem health, and other, it is impossible to infer from this data the extent to which prescribed burns may have had adverse impacts, or provided benefits, to sage-grouse.

Other techniques are also often used to manage vegetation, such as mowing, brush beating, chaining, harrow, and herbicides. However, due to differences in project documentation procedures and a lack of centralized reporting, acreages by vegetation type are not readily available. BLM Public Land Statistics 1999-2002³⁰ indicate that from 1999 (the first year data were reported in this manner) through 2002, approximately 209,628 acres of “non-fire fuels treatments” occurred on Idaho BLM Lands.

To effectively monitor the spatial and temporal extent of prescribed fire and other vegetation treatments as related to sage-grouse habitats, there is a pressing need for more consistent and detailed project reporting, across all agency jurisdictions. See Chapter 5.3 for discussion of processes for consolidating project reporting across Idaho.

4.3.7.2 Summary of key conservation issues

Prescribed fire and other sagebrush control activities can pose a risk to sage-grouse if projects are planned without the appropriate consideration for fine-, mid-, and broad-scale habitat conditions on the landscape and cumulative effects over time. In the context of this Plan, the primary threats from prescribed fire are (1) the elimination or reduction of sagebrush cover in situations where breeding or winter habitat may be already limited or fragmented on the landscape, and (2) risk of expansion by invasive plant species. In general, there is more treatment flexibility in situations where breeding or winter habitats are extensive on the landscape; invasives are uncommon

²⁹ Prescribed fire and non-fire fuels data as reported in PLS are not available beyond 2002.

³⁰ 1999 was the first year non-fire fuels treatment acreages were reported in PLS.

or are controllable; or in more resilient, higher elevation, mesic landscapes used primarily as late brood habitat.

- **Reduction of already limited or fragmented habitat:** While prescribed burns and other sagebrush management treatments have potentially beneficial outcomes, there is some risk that in certain situations, prescribed burn projects might adversely affect breeding or winter habitat. For example, Connelly et al. (2004) suggested that the recovery of sagebrush canopy cover to pre-burn levels may require 20 years or longer in some areas, and expressed concerns that short-term benefits such as increased forb production may not balance the loss of sagebrush canopy required during the nesting or winter seasons. Crawford et al. (2004) suggested that prescribed burning of sagebrush should not be used if sagebrush cover is a limiting factor for sage-grouse in the area. In all cases, vegetation management projects should be carefully planned *in consideration of the surrounding landscape*, and with an understanding of which seasonal sage-grouse habitats may be limited locally or in poor ecological health.
- **Expansion of exotic plant species:** Prescribed fire and sagebrush management treatments can pose a risk to sage-grouse if applied in areas prone to proliferation of exotic annuals (Connelly et al. 2000b). In such cases, provision must be made for the control of the invasive plant species and for the establishment of desirable perennial herbaceous species (Connelly et al. 2000b).
- **Risk of escaped prescribed fire:** Escaped prescribed fires pose a risk to adjoining seasonal habitats in suitable condition (meeting seasonal habitat criteria), and therefore may compound concerns about habitat availability.

4.3.7.3 Prescribed fire conservation measures

While the following list of conservation measures is focused most specifically on prescribed fire, the identified measures are also intended to address other sagebrush control conservation issues.

Goal: Plan and carry out prescribed burns and other sagebrush management projects in a manner that promotes ecosystem health and sustainability and that ensures the retention of sagebrush cover on a scale sufficient to meet the seasonal habitat needs of sage-grouse populations. Private landowners are encouraged to work closely with IDFG, NRCS, adjacent landowners and other partners, as appropriate.

Issue Addressed	Rationale	Conservation Measure(s)
Reduction of already limited or fragmented habitat	Inadequate planning and implementation of prescribed burns, or other sagebrush treatment projects, may adversely impact sage-grouse seasonal habitats and/or sage-grouse populations.	<ol style="list-style-type: none"> 1. Prior to planning prescribed burns, or other vegetation management treatments in sagebrush communities, ensure that sage-grouse seasonal habitats have been mapped (see 5.3.2 for additional discussion of mapping). 2. Once seasonal habitats have been mapped, ensure that proposed project areas have been evaluated on the ground in the context of the appropriate seasonal habitat characteristics.(See 5.3.2). 3. Avoid the use of prescribed fire, and other sagebrush reduction projects, in habitats that currently meet or are trending toward meeting breeding or winter habitat characteristics or in areas where sagebrush is limiting on the landscape. 4. If the analysis shows that a vegetation treatment may still be advisable, design habitat manipulation projects to achieve the desired objectives, considering the following: <ol style="list-style-type: none"> A. Where prescribed burning, or other treatments, in sage-grouse habitats may be warranted (e.g., sagebrush cover exceeds desired breeding or winter habitat characteristics; understory does not meet seasonal habitat characteristics and restoration is desired; there is a need to restore ecological processes; or a proposed treatment site is in an exotic seeding being managed for overall sage-grouse benefits on the surrounding landscape): <ul style="list-style-type: none"> ▪ Project design should be done with interdisciplinary input, and in cooperation with IDFG. ▪ Ensure that any proposed sagebrush treatment acreage is conservative in the context of surrounding seasonal habitats and landscape. ▪ Where appropriate, ensure that treatments are configured in a manner that promotes use by sage-grouse (see Connelly 2000 for additional discussion). ▪ Leave adequate untreated sagebrush areas for loafing/hiding cover near leks for sage-grouse. 4. Evaluate and monitor prescribed burns, and other treatments, as soon as possible after treatment and periodically thereafter to determine whether the project

Issue Addressed	Rationale	Conservation Measure(s)
		was successful and is meeting or trending toward desired objectives.
Expansion of exotic plant species	Inadequate planning, implementation and follow-up of prescribed burns or other sagebrush treatments may result in the expansion of cheatgrass or other invasive plant species.	1. Avoid the use of prescribed fire or other sagebrush treatments in habitats prone to the expansion or invasion of cheatgrass or other invasives unless adequate measures are taken to control the invasives and ensure subsequent dominance by desirable perennial species. In many if not most cases, this will likely require chemical treatments and reseeding.
Risk of escaped prescribed fire	Escaped prescribed fires can threaten surrounding habitats.	1. Prescribed fires must be planned, executed and monitored in a manner that provides for adequate control and provision for contingency resources. 2. Ensure burn plans address the importance of preventing escaped fires when prescription fires are planned in the vicinity of stronghold and key habitat.

Research, monitoring or evaluation needs: There is need for a more effective and consistent approach for the periodic mapping and classification of sagebrush habitats and cover classes using remote imagery. Research sage-grouse response to prescribed fire in the Mountain Big Sagebrush ecosystem.

4.3.8 Seeded perennial grassland

4.3.8.1 Threat summary and background

While of moderate risk individually, the link of perennial grasslands with other threats such as wildfire (and subsequent burned area rehabilitation), or annual grasslands (and restoration activities) suggest that its influence or significance as a threat may be more complex.

Native perennial grasslands can serve as a foundation for future sage-grouse habitat and are a normal, temporary result of wildfire in healthy sagebrush ecosystems. Seeded perennial grasslands can serve various purposes including as an intermediate treatment during the restoration of annual grasslands. Sage-grouse are known to use small patches or strips of seeded perennial grassland if adjacent to or surrounded by sagebrush. However, since sage-grouse are dependent on sagebrush, extensive areas of exotic and/or mixed seeded perennial grasslands can pose a threat to sage-grouse due to a lack of adequate sagebrush cover to meet seasonal habitat requirements. Seeded perennial grasslands characterized by aggressive, introduced grasses, such as crested wheatgrass, can also be limited in plant species diversity and structure. For a detailed discussion on this subject, see Pellant and Lysne (2005). The natural post-fire recovery of sagebrush in large grasslands can also be hindered if sagebrush seed-sources are limited. Without deliberate intervention to improve plant species diversity and structure, some large, seeded grasslands are unlikely to support habitat characteristics suitable for sage-grouse within a reasonable management timeframe.

In general, seeded perennial grassland areas in southern Idaho have been established for purposes of watershed stabilization following large rangeland wildfires; to provide competition from weeds such as *Halogeton*; and to provide improved livestock forage in some areas. More recently, efforts have been initiated to restore degraded areas with more diverse native and/or introduced perennial grass and forb mixtures in order to replace hazardous fuels, such as cheatgrass, and improve rangeland health and wildlife habitat. In the past introduced perennial grasses (e.g., crested wheatgrass) were often planted due to low cost and high likelihood of seeding success. They were also selected due to limited quantities of suitable native species, however, the availability and supply of these has increased in recent years. Recent policy changes and initiatives have also fostered the use of native species. Specifically, Presidential Executive Order 13112 on Invasive Species (Clinton 1999) directs Federal Agencies to use native species where feasible, and BLM's Great Basin Restoration Initiative favors the use of native species, "pending seed availability, cost and chance for success"(USDI-BLM 2000b). Regardless of the origin, large seeded grasslands with low plant species diversity, and/or sustained lack of sagebrush cover are not

compatible with the recovery of sage-grouse, and diversification efforts are warranted in some areas.

4.3.8.2 Summary of key conservation issues

- **Spatial extent of perennial grasslands on the landscape:** The extent of perennial grasslands in Idaho varies by SGPA (Figure 4-14). It is difficult at this time to spatially differentiate between true native grasslands, seeded native, seeded introduced or mixed native/introduced grasslands without more intensive mapping and ground-truthing efforts, or detailed review of agency project records. As mapping technologies and field inventory efforts improve, additional mapping refinements will be incorporated. The new ShrubMap regional landcover dataset (<http://sagemap.wr.usgs.gov/>) may be useful in preliminarily delineating annual and perennial grasslands.

Broad-scale spatial analysis of the 2004 Idaho Sage-grouse Habitat Planning Map indicates that perennial grasslands (all types combined) comprise approximately 2,933,439 acres within Idaho SGPAs (Table 4-11). The most extensive grasslands are associated with SGPAs in south-central Idaho including the Big Desert, East Magic Valley, West Magic Valley, and Jarbidge. Most current perennial grasslands are administered by the BLM but private, state, and Department of Energy lands harbor relatively substantial acreages as well (Table 4-11).

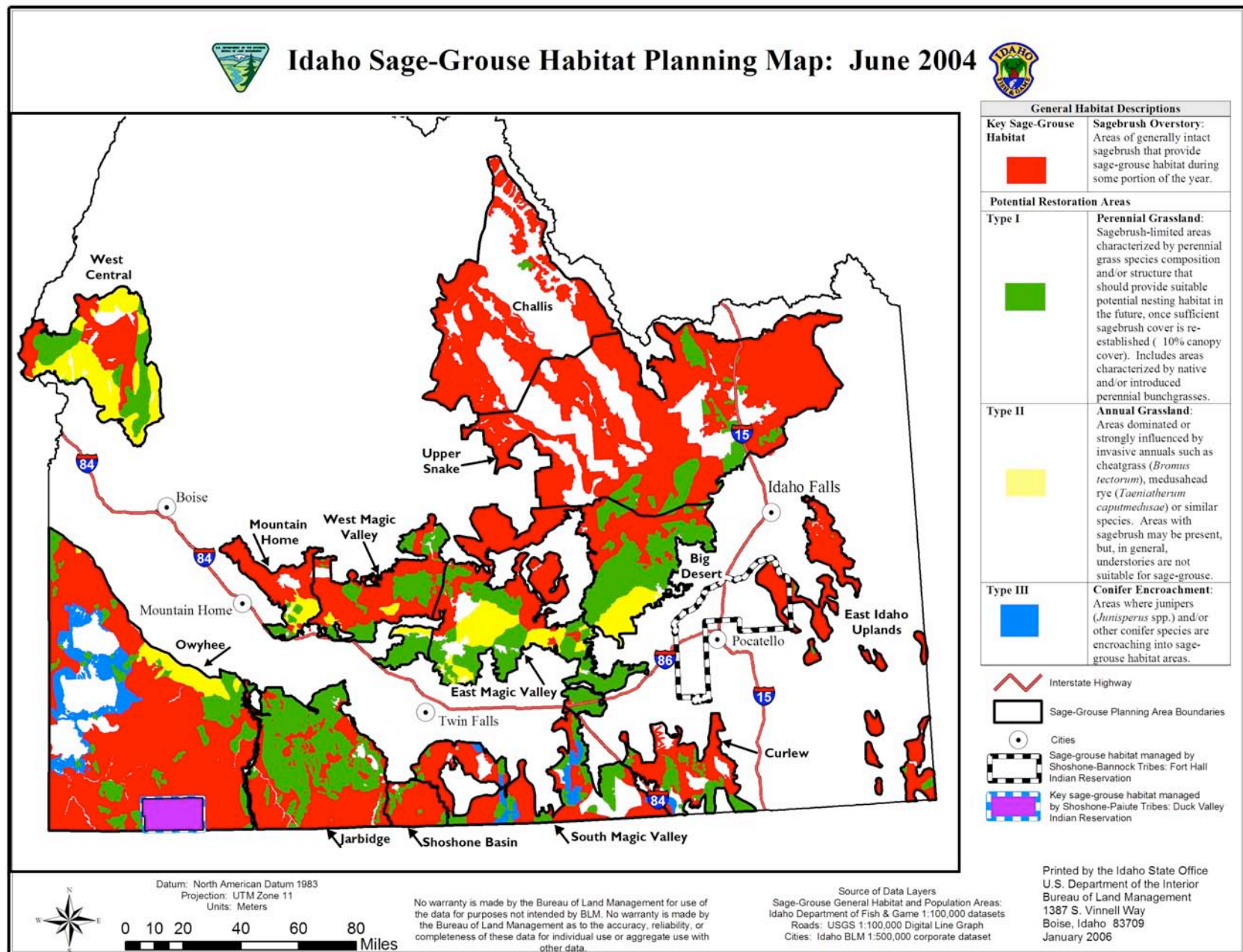


Figure 4-14 Idaho Sage-grouse Habitat Planning Map. Green areas indicate perennial grasslands.

Table 4-11 Perennial grasslands by Idaho Sage-grouse Planning Area and land-ownership status (USDI-BLM 2004a).

SGPA	Land-ownership status ³¹										Total
	BLM	BLM NM	BIA	USFS	DOE	MIL	NPS	Private	IDL	USFWS	
Big Desert	281,747	44,951	0	0	25,224	0	1,038	20,552	56,828	0	430,340
Challis	4,519	0	0	34	0	0	0	979	47	0	5,579
Curlew	53,775	0	0	7,466	0	0	0	39,354	2,087	0	102,682
East Idaho Uplands	5,928	0	2,246	0	0	0	0	6,927	719	2	15,822
East Magic Valley	399,026	34,609	0	0	0	0	1,933	37,912	19,886	10,551	503,917
Jarbridge	524,267	0	0	0	0	26,046	0	27,273	31,077	0	608,663
Mountain Home	21,012	0	0	0	0	0	0	7,191	396	0	28,599
Owyhee	274,294	0	0	0	0	5	0	9,795	15,800	0	299,894
Shoshone Basin	10,698	0	0	42	0	0	0	11,078	2,062	0	23,880
South Magic Valley	102,540	0	0	24,955	0	0	1,064	46,227	7,348	0	182,134
Upper Snake	84,804	0	0	1,078	113,936	0	0	27,197	6,105	8,131	241,251
West Central	103,408	0	0	1,015	0	0	0	95,009	15,511	0	214,943
West Magic Valley	214,520	0	0	0	0	0	0	39,087	22,128	0	275,735
Total	2,080,538	79,560	2,246	34,590	139,160	26,051	4,035	368,581	179,994	18,684	2,933,439

³¹ BLM: Bureau of Land Management; BLM NM: BLM-administered lands associated with Craters of the Moon National Monument; BIA: Bureau of Indian Affairs; USFS: U.S. Forest Service; DOE: Department of Energy, INEEL; MIL: Military; NPS: National Park Service; IDL: Idaho Department of Lands; USFWS: U.S. Fish and Wildlife Service. Acreages are approximate only and are reflective of the relatively broad nature of the 2004 SGHPM.

- **Reduced species diversity and structure:** At the finer more site-specific scale, some seeded perennial grasslands, aside from lacking in sagebrush cover, also may be deficient in plant species diversity and structure. Substantial acreages of Idaho BLM lands burned by wildfire have been aerially reseeded with sagebrush in recent years, and the use of native grass species in fire rehabilitation seedings and restoration projects is being emphasized where possible. Some successes have been noted. However, Dalzell (2004) in a study of 35 fire rehabilitation projects on the Snake River Plain, found no significant differences in species composition of seeded and unseeded burn plots, though cover of introduced species on unseeded plots was likely an artifact of older seeding efforts. Dalzell (2004) also reported poor establishment of Wyoming big sagebrush via aerial seeding, and suggested alternative approaches. Sagebrush and native grass restoration efforts can be problematic and are contingent on numerous factors including site potential, short-term climatic conditions, application techniques, competition from invasives, past seeding activities, reoccurring wildfires, and other factors. There is a continuing need for improved documentation, monitoring and reporting of restoration projects to facilitate information transfer and adaptive management.

The diversification of large, seeded grasslands to a structural and compositional state that contributes to sage-grouse conservation requires a long-term commitment. Several research projects underway in conjunction with the Great Basin Restoration Initiative will contribute to a better understanding of how to restore diverse, functional rangelands. Projects include the Great Basin Native Plant Selection and Increase Project; Coordinated Intermountain Restoration Project, Integrating Weed Control and Restoration for Great Basin Rangelands Project; and A Regional Experiment to Evaluate Effects of Fire and Fire Surrogate Treatments in the Sagebrush Biome.

4.3.8.3 Seeded perennial grassland conservation measures

Goal: To restore sagebrush and/or native grasses and forbs in seeded large perennial grasslands.

Issue Addressed	Rationale	Conservation Measure(s)
All	Lack of sagebrush on the landscape and lack of plant species diversity hinders the recovery of sage-grouse.	1. LWGs, land management agencies, IDFG and other partners should work closely together to identify and prioritize perennial grasslands (exotic versus native) where plant species diversity or sagebrush is limiting on the landscape; and work cooperatively to identify options, schedules and funding opportunities for re-establishing sagebrush in higher priority areas.

Issue Addressed	Rationale	Conservation Measure(s)
		<ol style="list-style-type: none"> <li data-bbox="784 226 1414 289">2. When seeding sagebrush, use source-identified, tested seed adapted to local conditions. <li data-bbox="784 321 1414 436">3. Consider using one or more of the following approaches for restoring sagebrush to improve likelihood of success (see Dalzell 2004 and Monsen et al. 2004): <ol style="list-style-type: none"> <li data-bbox="881 468 1414 562">A. Use of the “Oyer” compact row seeder, which compacts soil and presses seed onto the surface. <li data-bbox="881 594 1414 688">B. Use of the Brillion cultipacker seeder, where seed is broadcast over the surface followed by cultipacking. <li data-bbox="881 720 1414 772">C. Transplant bare-root or containerized stock in small, critical areas to establish a seed source. <li data-bbox="881 804 1414 919">D. Use the “mother plant” technique, and transplant bare-root or containerized stock in select locations throughout the area to establish a seed source. <li data-bbox="881 951 1414 1077">E. For large areas (e.g., large wildland fires) aerial seed onto a rough seedbed (Monsen et al. 2004) coupled with one or more of the above options. <li data-bbox="784 1108 1414 1287">4. In established stands of introduced perennial grasses, transplant sagebrush into strategic patches or strips in critical sites or throughout the area. Scalp spots or strips to reduce grass competition prior to planting or as an alternative to scalps, consider the use of herbicides (see Monsen et al. 2004, Volume 3). <li data-bbox="784 1318 1414 1444">5. Where the diversification of crested wheatgrass or similar seedings with native species of grasses, forbs and/or shrubs is desired Pellant and Lysne (2005) recommend a 3-step process: <ol style="list-style-type: none"> <li data-bbox="881 1476 1414 1654">A. Reduce competition of crested wheatgrass to facilitate the establishment and persistence of the desired species. Possibilities include use of livestock, capitalizing on drought episodes that reduce grass vigor, herbicides such as glyphosate, and mechanical treatments. <li data-bbox="881 1686 1414 1747">B. Introduce desired, site-adapted species through drill seeding, aerial seeding followed by

Issue Addressed	Rationale	Conservation Measure(s)
		<p>harrow, cultipacker or chaining, livestock trampling, transplanting container stock, bare-root stock or individual plants from native sources (“wildings”). Lambert (2005) provides descriptions, recommended seeding rates, and other useful information for nearly 250 species of native and non-native grasses, forbs and shrubs.</p> <p>C. Post-treatment management. Ensure that livestock grazing and rest intervals are matched with the phenology and life history characteristics of the desired/ seeded/ transplanted species. Implement monitoring to clearly document how, what, when and where treatments were implemented. Follow up with suitable effectiveness monitoring, to document success of the treatments relative to project objectives.</p> <p>6. Private landowners may wish to enroll in NRCS incentive programs as related to sage-grouse/sagebrush habitats. Current NRCS programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist and the EQIP Local Working Group. Another potential source of project funding for private lands are Idaho Office of Species Conservation project grants. Landowners interested in OSC grants are encouraged to work through their respective LWG or in the absence of an LWG, the appropriate IDFG Regional Office. Support for Idaho projects may also be available through the North American Grouse Partnership’s (NAGP) Grouse Habitat Restoration Fund. Interested parties should contact Mr. Kent Christopher at (208) 356-0079 or grouse@fretel.com.</p>

Research, monitoring or evaluation needs: Cooperate with the Great Basin Restoration Initiative research projects. Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

4.3.9 Climate change

4.3.9.1 Threat summary and background

The Society for Range Management recently published an issue paper titled *Rangelands and Global Change* (Brown et al. 2005; see http://www.rangelands.org/publications_brochures.shtml). The authors define “global change” as “*any change in the global environment that may alter the capacity of the Earth to sustain life.*” While global change has been occurring since the beginning of time, there is concern with changes attributable to growth in human populations and their use of natural resources (Brown et al. 2005). For example, atmospheric carbon dioxide concentrations may have increased by about 30% due to human activities the past 200 years (Polley 1997). As a result of this, potential changes in land use and productivity, atmospheric chemistry, water resources, ecological systems and climate are of concern.

The impacts of climate change in the context of this plan involve changes in the atmospheric chemistry, long-term temperature and precipitation, and water resources. It must be recognized, however, that while the evidence for human-induced climate change at the global level is increasing, it remains difficult to credibly predict specifically how climate change will impact any particular area (Brown et al. 2005). Climatic variability such as the frequency and severity of extreme events (e.g., droughts, severe rain events, floods, etc.) is likely to increase resulting in both positive and negative effects on the environment. Suring et al. (2005) estimated that over 4.2 million acres (1.7 million ha) of sagebrush cover types in the eastern Great Basin are at high risk of displacement by pinyon-juniper within the next 30 years. Modeling of projected vegetation distribution under seven climate change scenarios suggests decreases in shrubland area in the west during the next century, including a shift from shrubs toward savanna in the Great Basin (Bachelet et al. 2001). Some researchers suggest that sagebrush communities are projected to greatly decrease in area in the lower 48 states, or disappear altogether (Hansen et al. 2001). Additional information can be found at <http://www.fs.fed.us/pnw/corvallis/mdr/mapss/>.

Climate change is closely interrelated and synergistic with other important threats including wildfire and annual grasslands. Increased climatic variability may result in overall degradation of rangeland conditions and impairment of the ecosystem’s elasticity. Rangeland ecosystems are increasingly under threat from weeds, both exotic and native. Increases in invasive exotic species such as cheatgrass, medusahead rye, red brome, knapweed, leafy spurge, yellow starthistle, and woody native species such as juniper, has dramatically reduced the productivity of rangelands by garnering more of the limited resources like water, nutrients and

sunlight. Changes in land use and productivity frequently represent irreversible changes in ecosystem function on human time scales (Brown et al. 2005.)

Climate change impacts on community dynamics and health on rangelands may be magnified compared to other ecosystems due to the aridity and lower resiliency of these lands. Since climate change effects may be greater in these more arid landscapes, close analysis of management and restoration strategies used in the present is advisable, in order to be better prepared to meet potential climate related changes in the future (Mike Pellant, personal communication, July 2005). The response of rangeland vegetation to impending changes in the precipitation regime is likely to be complex and difficult to predict from existing knowledge. Plant response is likely to be highly species-specific, which suggests that current plant communities will not simply move to new landscape positions, but will be replaced by novel plant assemblages (Brown et al. 2005). Increased CO₂ in the atmosphere will favor cool season plants relative to warm season plants. Recent research has demonstrated that cheatgrass may respond more favorably to increased carbon dioxide (CO₂) than do some native plants (Smith et al. 2006) and that recent increases in CO₂ may already have increased cheatgrass production, increasing fuel loads and wildfires (Ziska et al. 2005).

The key to managing rangelands successfully in a changing global environment is maintaining and enhancing ecosystem resilience. Resilience is that property of an ecosystem that defines how well it can recover after disturbance or stress. Rangelands should be managed at the landscape and ecosystem level as well as at the SGPA or watershed scale. Many of the impacts of global change will be expressed unevenly across the landscape, but will be the result of processes and changes that accumulate over time periods and over large scales. Rangelands should also be managed to avoid catastrophic changes. Many of the rangelands in the western U.S. exhibit nonequilibrium dynamics and much of the degradation that has occurred historically may be permanent, at least on a human time scale (Brown et al. 2005).

Enterprises that extract a good or service from rangelands can be degrading if they do not reduce pressure on the resource in periods of unusual climatic events. Managing rangelands in the face of global change requires a shift in focus toward the restoration and enhancement of ecosystem resilience. Management flexibility should be a goal at multiple spatial scales (Brown et al. 2005).

4.3.9.2 Summary of key conservation issues

Global climate change is anticipated to be potentially detrimental to arid rangelands over time. Current management actions should consider long-term impacts and

trends. The maintenance of resilient ecosystems is key to long-term maintenance. Changes in climate in the Intermountain area are expected to favor cool-season species of exotic invasives such as cheatgrass (Smith et al. 2006) and native trees such as juniper (USDA-Forest Service -PNW 2004). Restoration needs to consider these changes within the life-span of the restored vegetation, especially at the drier end of the vegetation continuum. New monitoring strategies will also be necessary. Key issues include:

- **Increase awareness of expected impacts of climate change:** Increased awareness of global climate change and the expected impacts of global climate change to sagebrush ecosystems are essential to effectively responding to these changes. Climate change is expected to be detrimental to arid rangelands including the sagebrush steppe, due to increases in cheatgrass and other weeds, juniper expansion, and increased wildfire risk. Ensuring that healthy sagebrush communities are maintained into the future will require adaptive management.
- **Maintain ecosystem resiliency:** Maintain maximum resiliency of ecosystems by maintaining and/or managing towards healthy, diverse, sustaining vegetation communities with high levels of vegetation vigor.
- **Control exotic invasive species:** Active management of exotic invasive species, such as cheatgrass, medusahead, and noxious weeds will be required to prevent continuing losses of native vegetation and the potential large-scale replacement of native plant communities with exotic communities. Detailed information on the spatial distribution of noxious weed species, such as spotted knapweed, leafy spurge, rush skeletonweed, and others is maintained by the Idaho Department of Agriculture through county-level Cooperative Weed Management Area programs and agency offices.
- **Restoration with suitable plant materials:** In restoration efforts in lower rainfall vegetation communities, include seed from warmer portions of a species range which will be better adapted to the predicted warmer conditions anticipated in the future. Factor climate change predictions into restoration efforts that are creating long-term vegetation communities.
- **Improved monitoring approaches:** Develop monitoring strategies to track subtle, long-term changes to the vegetative landscape.

4.3.9.3 Climate change conservation measures

Goal: Maintain resilience of sagebrush steppe vegetation communities as global climate changes increase the environmental stress on the community's ecological viability.

Issue Addressed	Rationale	Conservation Measure(s)
Increase awareness of expected impacts of climate change	Without awareness and understanding of the significance of climate change on the sagebrush ecosystem successful adaptive management is less likely to occur.	<ol style="list-style-type: none"> 1. Support efforts by the Society for Range Management, and others to inform constituents of the seriousness of global climate change expectations. 2. Factor climate change needs and philosophy into current management of arid and semi-arid rangelands.
Maintenance of ecosystem resiliency	Conservative use and management will be necessary to allow plant communities to combat on-going environmental stress from climate change.	<ol style="list-style-type: none"> 1. Avoid degradation of current vegetation communities. 2. Reduce pressure on the resource in periods of unusual climatic events such as drought. 3. Focus management of rangelands on restoration and resiliency of the vegetative resource.
Control exotic invasive species	Maintain viability of native plant communities by decreasing stress caused by undesirable invasive species.	<ol style="list-style-type: none"> 1. Increase knowledge and awareness of invasive species problems on native ecosystems. 2. Reduce impacts of land uses that increase the rate of spread of invasive species. 3. Manage native plant communities to maintain biotic soil crusts (where appropriate), improve or maintain high vigor of native vegetation, and reduce use during periods when use favors invasive species ecologically. 4. Increase the pace of active control/elimination of invasive species in situations where other management is not capable of reducing the competition. Work closely with Cooperative Weed Management Areas/ programs to control noxious and invasive weeds.
Restoration with suitable plant materials	Restore plant communities that have the potential of	<ol style="list-style-type: none"> 1. Include seed from the warmer part of a species' range in mixes that are used to restore degraded sites.

Issue Addressed	Rationale	Conservation Measure(s)
	surviving and adapting to climate change expectations.	<ol style="list-style-type: none"> 2. Include Wyoming big sagebrush seed in mixes for drier/warmer areas that are on the lower transitional elevation fringes of mountain big sagebrush vegetative sites. Consider using alternative approaches to improve the likelihood of establishment, such as hand-planting seedlings, imprinters or other tools (See related discussion in Section 4.3.8.3). 3. Use local, native seed stock (where feasible and desirable) to reseed disturbed areas. 4. Anticipate impacts of climate change on biological control agents and potential for problems to native species.
Improved monitoring approaches	To manage the changes we must understand and anticipate the changes that are occurring.	<p>As opportunities permit, cooperate with Universities and other partners to:</p> <ol style="list-style-type: none"> 1. Define the capability of ecosystems and vegetation communities to withstand stress and/or disturbance and maintain capability of full recovery. 2. Develop high quality, consistent, and accessible soil and vegetation data and models that describe how changes occur in response to stress and disturbance. 3. Develop a system that identifies the effects of global change in the very early stages and identifies appropriate management responses. 4. Develop new concepts of landscape scale management of rangelands to provide for adaptive management in response to climate change. 5. Develop monitoring systems that track and predict how changes in land use and cover affect ecosystem function across spatial scales on rangelands. 6. Acquire quantitative knowledge of ecological thresholds, indicators of change, and key decision points in the framework of comprehensive monitoring systems. 7. Improve coordination and communication links between researchers and land managers.

Research, monitoring or evaluation needs: Define the capability of ecosystems and vegetation communities to withstand stress and/or disturbance and maintain capability of full recovery. Develop high quality, consistent, and accessible soil and vegetation data and models that describe how changes occur in response to stress and disturbance. Develop a system that identifies the effects of global change in the very early stages and identifies appropriate management responses. Develop new concepts of landscape scale management of rangelands to provide for adaptive management in response to climate change. Develop monitoring systems that track and predict how changes in land use and cover affect ecosystem function across spatial scales on rangelands. Acquire quantitative knowledge of ecological thresholds, indicators of change, and key decision points in the framework of comprehensive monitoring systems. Improve the commercial availability and supply of native grasses and forbs suitable for restoration in arid and semi-arid environments.

4.3.10 Conifer encroachment

4.3.10.1 Threat summary and background

The accelerated post-settlement expansion of conifer woodlands (mainly juniper species) occurred synchronously with the introduction of livestock, changes in mean fire-return intervals, and optimal climatic conditions (Tausch et al. 1981, Miller and Rose 1999, Miller and Tausch 2001). Juniper and pinyon woodlands have increased tenfold in extent since the late 1880s, and currently occupy 189,000 km² in the Intermountain region Miller and Tausch (2001). Connelly et al. (2004) estimated that 35% of sagebrush habitats in the Great Basin (Utah, Nevada) are at high risk of displacement by pinyon-juniper within the next 30 years, and summarizes the mechanisms by which encroachment occurs. Climate models suggest that expansion of juniper will continue throughout the 21st century (USFS-PNW 2004). Suring et al. (2005) estimated that over 4.2 million acres (1.7 million ha) of sagebrush cover types in the eastern Great Basin are at high risk of displacement by pinyon-juniper within the next 30 years. Miller et al. (2005) provide a detailed discussion on the biology, ecology and management of western juniper, and is recommended reading.

The projected encroachment of conifers into sagebrush communities and other important habitats constitutes a tangible, visible threat to sage-grouse in portions of several Idaho SGPAs, and is therefore of concern to several LWGs (Figure 4-15). Depending on the locality, conifer encroachment into breeding, late brood-rearing, fall, or winter habitat may be occurring, and should be addressed depending on local needs and priorities. Species such as western juniper (*Juniperus occidentalis*), Utah juniper (*Juniperus osteosperma*), and Douglas-fir (*Pseudotsuga menziesii*) are the species of primary interest depending on locality and elevation. To a lesser extent, encroachment by single-leaf pinyon pine (*Pinus monophylla*) and Rocky Mountain juniper (*Juniperus scopulorum*), or other species may also be of concern in certain situations.

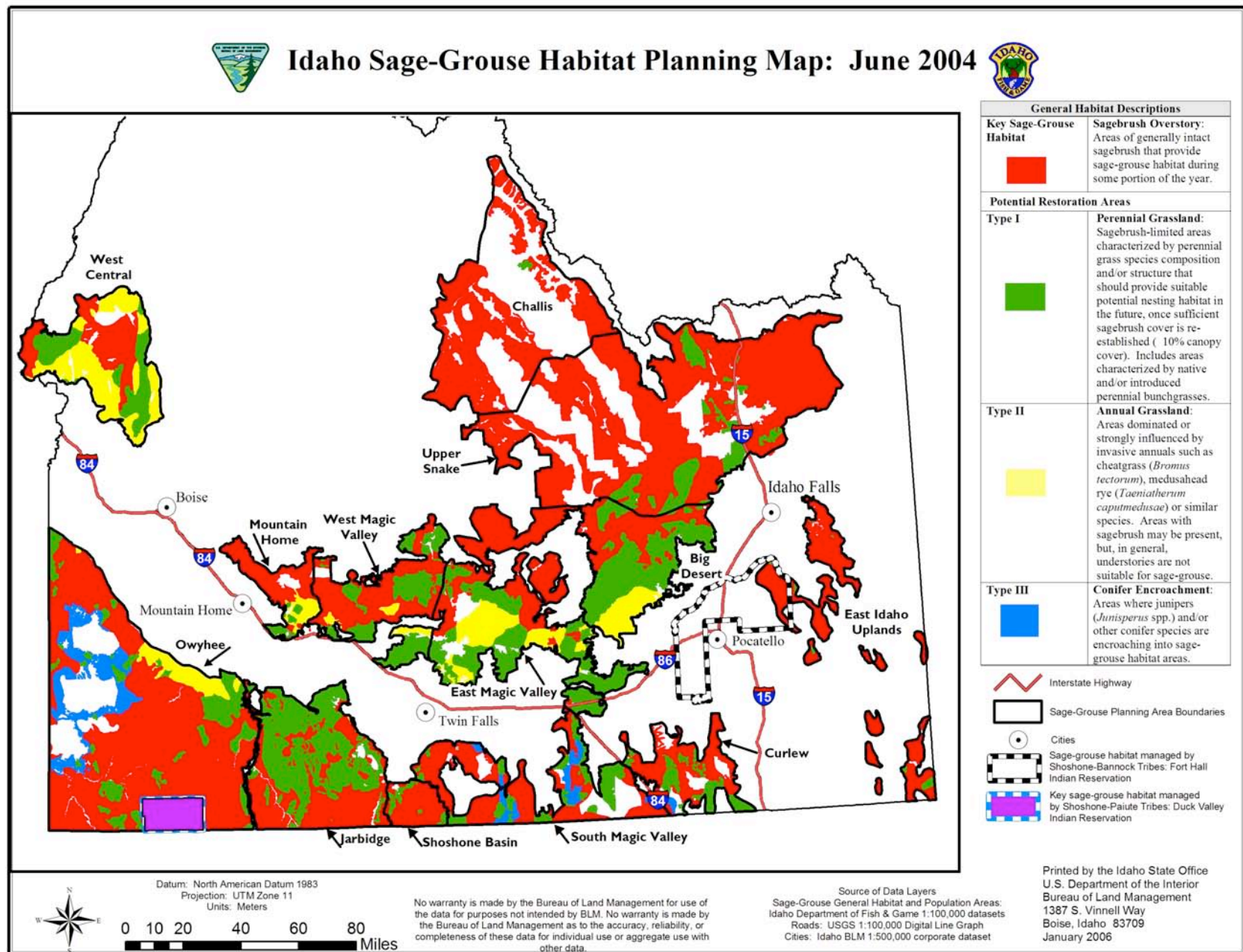


Figure 4-15 Idaho Sage-grouse Planning Areas and conifer encroachment. Blue areas indicate conifer encroachment.

4.3.10.2 Summary of key conservation issues

- **Spatial extent of conifer encroachment on the landscape:** Spatial analysis of the 2004 Idaho Sage-grouse Habitat Planning Map indicates approximately 355,004 acres of conifer encroachment in SGPAs (Table 4-12). BLM lands constitute 69% of the total, followed by private (22%), state (9%), and USFS (0.1%). Acres primarily reflect western juniper (Owyhee SGPA) or Utah juniper (Curlew, South Magic Valley SGPA) encroachment. Douglas-fir or other species may constitute an encroachment risk in portions of the Challis and Upper Snake SGPAs, or elsewhere, but encroachment zones have not been mapped or quantified to date. As mapping technologies and field inventory efforts improve, additional refinements will be incorporated. Again, while the extent of juniper encroachment on the southern Idaho landscape is relatively minor in comparison with seeded perennial grasslands or annual grasslands, its influence locally is of significant concern.

Table 4-12 Conifer encroachment acres by Idaho SGPA and land-ownership status (USDI-BLM 2004a).

SGPA	Acres ³²				
	BLM	USFS	IDL	Private	Total
Curlew	9,293	0	0	294	9,587
Owyhee	165,138	0	26,897	69,284	261,319
South Magic Valley	69,014	431	6,690	7,963	84,098
Total	243,445	431	33,587	77,541	355,004

- **Reduction of habitat quality:** Conifer encroachment typically occurs along or near the sagebrush-woodland interface due to the lack of wildfire or other disturbance. Over time, as juniper or other conifer cover increases, sagebrush cover and other understory species decline (Miller and Eddleman 2001, Miller et al. 2005). Consequently, over time, sage-grouse breeding, and brood and winter habitat declines both in quantity and quality. In some areas, particularly at higher elevations, the encroachment of conifers, including Douglas-fir, into wet meadows or riparian areas reduces brood habitat suitability. Pinyon pines, junipers or other trees or structures in the vicinity of leks provide potential perches for avian predators and appear to increase the risk of predation of males. Removal of trees within 100 m of leks doubled attendance by males two and three years post-treatment (Commons et al. 1998). It is assumed that removing

³² BLM: Bureau of Land Management; USFS: U.S. Forest Service; IDL: Idaho Department of Lands. Acreages are approximate only and are reflective of the relatively broad nature of the 2004 Sage-Grouse Habitat Planning Map.

additional encroaching trees that occur beyond 100 m of leks is also beneficial, particularly if trees are relatively numerous or scattered, though the exact distance is unknown. Management of encroaching trees should be done carefully though, as other species of concern that utilize junipers, most notably the ferruginous hawk, may occupy the same habitats as sage-grouse.

4.3.10.3 Conifer encroachment conservation measures

Goal: To reduce the influence of conifer encroachment on sage-grouse and sage-grouse habitat.

Issue Addressed	Rationale	Conservation Measure(s)
All	Conifer encroachment into sagebrush communities reduces sage-grouse habitat quality and availability	<ol style="list-style-type: none"> 1. LWGs, land management agencies, IDFG and other partners should work closely together to identify and prioritize conifer encroachment areas for further management action. Work cooperatively to identify options, schedules and funding opportunities for specific projects. For western juniper, Miller et al. (2005) provide <i>Guidelines for Selecting the Most Appropriate Management Actions</i>, on pages 54-57. 2. IDFG, land management agencies, LWGs and other partners should work closely together to identify leks where conifer encroachment may be affecting lek attendance or nearby habitat quality. 3. Remove Douglas-fir or other conifers where they are encroaching on wet meadows, riparian areas or sagebrush stands that provide potential sage-grouse habitat. 4. Remove juniper, Douglas-fir, pinyon pine, or other trees within at least 100 m (330 ft or 8-acre area) of occupied sage-grouse leks. The purpose of this procedure is to reduce perching opportunity for raptors or other avian predators within view of leks. Techniques could include chainsaw, chipper, or other suitable mechanical means. Ensure cutting and slash disposal is completed between approximately July 15 and January 30 to minimize disturbance to grouse that may be in the vicinity (e.g., males at leks, nesting females, young broods). This practice serves to reduce predation on sage-grouse by raptors by eliminating potential perches, thereby improving survival, recruitment, and productivity. It may be particularly valuable where avian predation may be of greater concern such as in areas with fragmented habitat, nearby infrastructure features, and/or in the

Issue Addressed	Rationale	Conservation Measure(s)
		<p>case of small, isolated sage-grouse populations.</p> <ol style="list-style-type: none"> 5. Where juniper or other conifer species have encroached upon sagebrush communities at larger scales, employ prescribed fire, chemical, mechanical (e.g., chaining, chipper, chainsaw, commercial sale) or other suitable methods to reduce or eliminate juniper. Priority should be given to areas where there is a strong likelihood for recovery of perennial herbaceous vegetation or where preparatory and follow-up actions (e.g., control of invasives, seeding) are likely to be successful. Whenever possible, but especially if sagebrush habitat is limited locally, use juniper control techniques that are least disruptive to the affected stand of sagebrush. For example, if junipers are only scattered, and the associated sagebrush community is otherwise relatively healthy, cutting junipers with chainsaws will remove the encroachment threat, while allowing for immediate use of the sagebrush by sage-grouse. In all cases, control efforts should be planned using interdisciplinary expertise. 6. On private lands, apply for OSC sage-grouse grant funds, or enroll in NRCS incentive programs related to sage-grouse/sagebrush habitats. Current NRCS programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist. Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund. Interested parties should contact Mr. Kent Christopher at (208) 356-0079 or grouse@fretel.com. 7. Where juniper control around leks is planned, monitor leks for at least 3 consecutive years post-treatment to document effects on lek attendance. Ideally, 2 to 3 years of pre-treatment monitoring is also recommended, but this may not always be feasible. 8. Plan wildfire suppression strategies to support this goal.

Research, monitoring or evaluation needs: Document and refine our understanding of how the reduction of conifer encroachment affects sage grouse populations or lek attendance.

4.3.11 Isolated populations

4.3.11.1 Threat summary and background

Most sage-grouse habitats and “populations” in Idaho are relatively contiguous and not isolated (2004 Idaho Sage-grouse Habitat Planning Map). However, of seven geographic areas in Idaho evaluated by the Panel, the West Central SGPA and southeastern Idaho area (East Idaho Uplands and Curlew SGPAs combined) were considered at greatest risk of sage-grouse extirpation. In particular, the West Central SGPA is separated from others by relatively large distances, and contains substantial annual grasslands and private lands. A portion of the South Magic Valley SGPA also includes what is assumed at this time to be a relatively isolated population inhabiting the Cotterel and Jim Sage Mountains. A small population existed historically in the Sawtooth Valley south of Stanley, but its current status is unknown.

4.3.11.2 Summary of key conservation issues

- **Need for better information related to population status and trends:** Little is known regarding population demographics of the isolated populations described above. Specifically, information on dispersal, genetic interchange, survival, and nest success is largely unknown. Monitoring underway in the West Central and Cotterel areas will help refine our understanding of these two areas.
- **Need for evaluation and monitoring of threats to isolated populations:** Isolated populations are of concern in that they are considerably more vulnerable to extirpation in the event of large wildfires, disease outbreaks (e.g., West Nile virus), predation influences, over-hunting, or other factors. Infrastructure features also may affect isolated populations to a greater extent, due to their small scale. Small, isolated habitats can also become occupied by invasive plant species in a short timeframe.
- **Need to improve or restore habitat associated with isolated populations:** The West Central SGPA and Cotterel/Jim Sage portion of the South Magic Valley SGPA include areas of annuals and/or conifer encroachment. In the latter area, cheatgrass control/restoration, burned area rehabilitation, and juniper management projects in the latter have been underway for several years.

4.3.11.3 Isolated populations conservation measures

Goal: To ensure that isolated sage-grouse populations remain viable.

Issue Addressed	Rationale	Conservation Measure(s)
Need for better information related to population status and trends	Status, survival and trend data relative to isolated populations is lacking	<ol style="list-style-type: none">1. See Population Monitoring Section 5.2.2. LWGs and agencies should coordinate in further refining and delineating sage-grouse populations, to the extent feasible.
Need for evaluation and monitoring of threats to isolated populations	The nature and extent of threats to isolated populations is unknown in some areas.	<ol style="list-style-type: none">1. LWGs and agencies should work together to identify and quantify threats within isolated population areas.
Need to protect, improve or restore habitat associated with isolated populations	Some isolated population areas have substantial areas of habitat in need of restoration. See Idaho Sage-grouse Habitat Planning Map.	<ol style="list-style-type: none">1. Ensure that vegetation prescriptions, hunting regulations, and permitted land-use activities are consistent with maintaining isolated populations and with maintaining or improving associated habitat. See conservation measures for specific threats.

Research, monitoring or evaluation needs: Better information on sage-grouse populations in priority areas is needed.

4.3.12 Predation

The majority of reported mortalities for grouse species, including sage-grouse, are due to predation (Bergerud 1988). However, predation plays a role in the ecology of every animal species, and is a natural process in all ecosystems. Prey species, including sage-grouse, play an important role in energy flow between trophic levels. In most prey species mortality is greatest during the early stages of development and decreases after young reach adult size, with relatively few of the young surviving to breed (Northeastern Nevada Stewardship Group 2004).

Sage-grouse are an important prey species commonly fed upon by a number of predators in Idaho. Coyotes, ravens and various raptors have also been noted to disturb or harass sage-grouse on leks (Bradbury et al. 1989). Sage-grouse appear especially wary of the presence of golden eagles (Hartzler 1974). While some level of predation should be expected in all sage-grouse populations, in certain situations predator/prey relationships may become disrupted, resulting in excessive predation. For example, the establishment of non-native predator species or an unusually high number of one or more predator species, may be cause for concern. Isolated or poor habitat conditions may also lead to increased predation. In general, predation has the potential to affect sage-grouse populations by reducing nest success, reducing the survival of juveniles, and/or reducing the survival of adult birds (Connelly et al. 2004). Some people assert that predation does not appear to be a widespread factor controlling sage-grouse populations (Connelly et al. 2004). However, others contend that predation may comprise a significant limiting factor to sage-grouse in some areas depending on localized variations in predator/prey relationships and local habitat conditions. Some Idaho LWG members believe predation is a serious limiting factor in their local SGPAs.

4.3.12.1 Threat summary and background

No predators are known to be dependent on sage-grouse as a primary food source (Connelly et al. 2004). Sage-grouse predators include the golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), common raven (*Corvus corax*), weasel (*Mustela* spp.), coyote (*Canis latrans*), and red fox (*Vulpes vulpes*) (Rasmussen and Griner 1938, Scott 1942, Patterson 1952, Dunkle 1977, Bunnell et al. 1999). Predation of sage-grouse by ferruginous hawks (*Buteo regalis*) has been noted in southern Idaho (D. Gossett, personal communication 1/2006). Willis et al. (1993) suggested that year-to-year fluctuations of sage-grouse productivity in Oregon may be highly influenced by changes in the abundance of coyotes and ravens.

The relative abundance of coyotes in southern Idaho appears to have increased since the early 1950s, based on an index of aerial hunting effort (USDA-APHIS 2002). Other trend data are not available at this time. Fichter and Williams (1967) reported that red fox populations increased locally beginning in approximately 1960, and have been relatively abundant in southern Idaho for the past several decades (USDA-APHIS 2002). USFWS Breeding Bird Survey data suggest that raven populations have increased steadily since 1968 (USDA-APHIS 2002). New high-voltage power transmission lines resulted in an increased number of breeding raptors and ravens in southern Idaho and Oregon, on rangelands where natural nest substrates were previously lacking (Steenhof et al. 1993).

- **Predation of adults:** A number of predator species prey on both adult and juvenile sage-grouse including the coyote, badger (*Taxidea taxus*), bobcat (*Lynx rufus*), several species of raptors (Patterson 1952, Schroeder et al. 1999, Schroeder and Baydack 2001), and red fox (Bunnell et al. 1999).

Some authors suggest that predation is an important influence on females during incubation and brood-rearing, and for males during the breeding season (Patterson 1952, Schroeder et al. 1999). In a Colorado study, Zablan (2003), reported annual survival rates of 59.2% for adult females, 77.7% for yearling females, 36.8% for adult males, and 64.5% for yearling males. Two studies in Idaho reported adult annual survival rates ranging from 42 to 75% (Connelly et al. 1994, Wik 2002). Annual survival of breeding-aged birds tends to be greater than 50% in most situations, and as high as 75% for breeding-aged females in Idaho. In general, survival rates for sage-grouse are higher than those of other gamebirds (Connelly et al. 1994)³³.

Predation of nests: Nest predators noted in the literature include coyotes, badgers, ground squirrels (*Spermophilus* spp.), common raven, and magpies (*Pica pica*) (Patterson 1952, Schroeder et al. 1999, Schroeder and Baydack 2001). Corvids (ravens) have been reported by several authors to prey on sage-grouse nests, and/or chicks (Batterson and Morse 1948, Nelson 1955, Autenrieth 1981, Young 1994, DeLong et al. 1995, Sveum 1995). In northern Nevada, videography has documented raven depredation of sage-grouse eggs (Pete Coates, personal communication, November 3, 2005).

Patterson (1952) implicated Richardson's (*Spermophilus richardsonii*) and thirteen-lined ground squirrels (*S. tridecemlineatus*) in 42% of depredated sage-grouse nests across two study areas in Wyoming. However, Holloran (1999) documented visits to sage-grouse nests by Richardson's and thirteen-lined

³³ See Section 2.1 for more detailed discussion of sage-grouse ecology.

ground-squirrels with the aid of concealed motion-sensitive cameras, but concluded these species were not responsible for predation. While neither Richardson's nor thirteen-lined ground squirrels occur in Idaho, several species of ground squirrel are present (Yensen and Sherman 2003). Thus, the risk and magnitude of nest predation or egg disturbance by ground squirrels in Idaho remains uncertain.

Overall, the literature suggests that sage-grouse nest success varies between 14.5% and 86.1% (Connelly et al. 2004). Bergerud (1988) considered sage-grouse nest success as generally low, averaging 35%, across 12 studies (n=699 nests). Nest success across 16 radio-telemetry studies across 7 states and provinces (n=1,225 nests) averaged 47.7% (Connelly et al. 2004). Nest success for sage-grouse in Idaho, across three radio telemetry studies averaged over 49% (Connelly et al. 2004).

Habitat loss or reduction may concentrate nesting female sage-grouse, reducing the size of area predators need to search (Bergerud 1988). Man-made features, such as those that provide avian perch sites, travel lanes or dens, may also lead to nest predation, by facilitating predator access to nesting habitats (Bergerud 1988). In general, the canopy cover of tall grasses and medium height sagebrush is inversely related to the probability of nest predation (Connelly et al. 1991, DeLong et al. 1995, Sveum et al. 1998 cited in Crawford et al. 2004).

Connelly et al. (2004) cite several more recent studies that documented sage-grouse survival and nest success (Gregg 1991, Robertson 1991, Connelly et al. 1993, Gregg et al. 1994, Holloran 1999, Lyon 2000, Wik 2002). Among these seven studies, only Gregg (1991) and Gregg et al. (1994) reported that predation was limiting sage-grouse populations by limiting nest success; and in these cases the relationship was linked to poor nesting habitat. Connelly et al. (2004) suggest that since most studies report nest success rates exceeding 40%, nest predation is not a widespread problem. Little information is available regarding the impacts of predator control on nest success. In Wyoming coyote control actions failed to produce an effect on nesting success (Slater 2003).

- **Predation of juveniles:** Young birds may be killed by the common raven, northern harrier (*Circus cyaneus*), and weasel (Schroeder et al. 1999). Red-tailed hawks and ferruginous hawks (*Buteo regalis*) have also been noted to prey upon juvenile sage-grouse (Patterson 1952 cited in Autenrieth 1981). Carhart (1942) cited in Autenrieth (1981) reported juvenile sage-grouse remains in 55% of Swainson's hawk nests visited. Available information suggests that juvenile survival is low, but this factor has been difficult to document in the field (Crawford et al. 2004). Predation of juveniles may be particularly important during the first few weeks after hatch (Connelly et al. 2004). In Montana,

survival of sage-grouse chicks during the first three weeks after hatching was 37% (Wallestad 1975 cited in Schroeder and Baydack 2001). From 1999-2002, research was conducted on chick survival in the Upper Snake SGPA (N. Burkipile, University of Idaho, in progress). Information forthcoming in the near future from this study should contribute useful new information regarding juvenile survival.

4.3.12.2 Summary of key conservation issues

An array of predator species may potentially influence sage-grouse populations. Predator control, as a practice, is controversial from ethical, economic, and effectiveness perspectives. Some people believe that predators are a major factor limiting sage-grouse, and feel that more effort should be expended on predator control activities. Others contend that since predation is a natural process, predators should not be controlled at all. Still others believe that predator control may be appropriate in certain situations, or only as a last-resort. Schroeder and Baydack (2001) suggested that as populations of prairie grouse become smaller and more threatened, direct control of predators may need to be considered more carefully. Predator-related issues that may require specific conservation responses are grouped under the single conservation issue that follows.

- **Excessive levels of predation can be detrimental to sage-grouse populations:** While some level of predation is always to be expected, the question of how much predation is acceptable before control actions are initiated is difficult to assess. Related to this question is the difficulty of understanding the complex interactions of multiple threats and landscape conditions, and how these factors collectively influence predation.

There is no universally accepted definition of excessive predation. Indicators of excessive predation may include on a three year running average: nest success rates below 25%, production rates below 2.25 juveniles per adult hen, adult female annual survival rates below 45%, in combination with declining population indices and assuming habitat and weather conditions are normal. Site-specific conditions influence what constitutes excessive predation. Moreover, isolated and at risk populations may not fit within these criteria.

Factors such as poor habitat quality, habitat fragmentation, and isolation of populations, may result in excessive predation on one or more sage-grouse sex or age-classes (e.g., egg, juvenile, adult female/male). The nature and degree of infrastructure development in some areas may also exacerbate predation risk, by concentrating certain predators. Very small or isolated populations have the

potential to disappear in short timeframes due to the generally low reproductive rates of sage-grouse, and because grouse utilizing small areas of habitat are more vulnerable to predators.

Man-made structures can facilitate avian predation of sage-grouse. While we have a generally good understanding of lek locations and man-made structures in many areas, typically we do not know which structures may be posing a problem.

More information is also needed to determine the presence and possible effects of non-indigenous predators or abnormally high levels of predators on sage-grouse populations, regardless of habitat quality.

Because of the many variables and uncertainties associated with excessive predation, there is a clear need for a systematic approach that LWGs can use to assess sage-grouse population status, habitat conditions and threats at the local level so that appropriate actions can be identified and pursued. LWGs should utilize the approach outlined below, though LWGs may consider additional criteria, depending on local issues and conditions.

4.3.12.2.1 Considerations for addressing sage-grouse predation issues in Idaho

Site-specific conditions, such as habitat quality or isolation, or weather events (e.g., extended drought) may influence predation at any given location. Due to cost, logistical, ecological and societal concerns related to predator control, it is essential to first adequately describe the context within which predation is operating, and to determine if predator control is indeed warranted. It is also essential that all interested parties, including APHIS-Wildlife Services be involved at the outset.

Local Working Groups should consider the following questions when determining the nature and extent of potential predator problems in a specific geographic area. The process outlined below will also be helpful in identifying other threats. Suggested threshold population indices or “triggers” are provided where appropriate. It is important that LWG members discuss these questions and document conditions prior to proposing predator control actions. Such a systematic approach will help guide their local planning efforts and will help to ensure that excessive predation and other threats are dealt with appropriately.

1. What is the status of the sage-grouse “population” in question (on a three-year running average)?

- Is the population considered isolated or is it a stronghold? Refer to the latest version of the Idaho Sage-grouse Habitat Planning Map.

- Is the population migratory or non-migratory?
- Is the status of each lek known? Are lek counts conducted annually? Is production assessed annually?
- Are population trend indices (e.g., lek counts) declining, stable, or increasing?
- If population trend is down, what are the reasons? Has there been a recent drought or large wildfire or other factor influencing trend?
- Is annual productivity, as determined by the fall ratio of juveniles/ hen below 2.25? (Note: 2.25 juveniles/hen is the suggested indicator for stable or increasing populations, Connelly and Braun 1997 and Edelman et al. 1998).
- Is nest success (proportion of nests that hatch at least one egg per season) less than 25%? Connelly et al. (2004) reported a range of 14.5% to 86.1%.
- Is average adult female survival rate less than approximately 45%? Connelly et al. (2004) report a range of 48-75%.
- Is annual hunter harvest within recommended WAFWA Guidelines? See Sport Hunting section for additional details.

2. What is the status of sage-grouse habitat in the area?

- Are the important seasonal habitats known (breeding, late brood, winter)?
- Are seasonal habitats generally contiguous or fragmented?
- Do the respective seasonal habitats generally meet WAFWA Guidelines, or is there a considerable departure from the Guidelines for one or more of them?
- If there is a departure from Guidelines, what can or should be done to restore desired habitat conditions (long-term habitat restoration combined with short-term predator control)?
- What is the land status? Predominantly private, public, mixed?

3. What is the nature and extent of other threats in the area?

- Is infrastructure (e.g., power pole cross-arms, or other man-made structures) providing opportunities for ravens or raptors to perch or nest in proximity to important habitats?
- Is conifer encroachment inhibiting lek quality or activity?
- Is human disturbance of leks or breeding habitat a significant factor?

4. What is the status of predation and predators in the area?

- What potential predator species are present?
- Do the predator species of concern have legal protection through state or federal law (e.g., game or protected non-game, Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, etc.) Who has management authority for the predator species?

- Is the suite of predators or population levels present inconsistent with what is expected in healthy sagebrush steppe habitats? Are there non-indigenous predators present?
- Has excessive predation of nests, juveniles or adults been documented?
- What is the predicted population response of other predator species to removal of the target species?

5. If predator control is recommended:

- Is a viable control method and adequate funding available?
- Have humane predator control techniques been considered as a first option wherever possible?
- Have clear objectives been defined that describe when successful control has been achieved?
- Can the predator species of concern be identified and effectively targeted?
- If so, is lethal take recommended or are there non-lethal or passive control alternatives?
- Are surrounding landowners supportive?
- Has the appropriate environmental analysis been completed?
- Has the proposed action been adequately designed with suitable control and treatment areas, so effects can be assessed and documented?
- Have pre-treatment and post-treatment monitoring protocols been established?

4.3.12.3 Predation conservation measures

Goal: Manage excessive predation to enhance sage-grouse survival and production as appropriate to local conditions.

Issue Addressed	Rationale	Conservation Measure(s)
Excessive levels of predation can be detrimental to sage-grouse populations	The scale, quality or configuration of habitat; infrastructure; non-indigenous predator species or artificially high predator populations may contribute to excessive predation.	<p>1. Evaluate local conditions using the systematic approach presented above in Section 4.3.12.2.1.</p> <p>Depending on the outcome of the local evaluation consider implementing one, or a combination, of the conservation measures identified below:</p> <p>A. If excessive predation is the result of poor habitat conditions:</p> <ul style="list-style-type: none"> ▪ Take actions to correct the habitat deficiencies for the long-term. ▪ Consider predator control for at risk or isolated populations as a short-term measure.

Issue Addressed	Rationale	Conservation Measure(s)
		<p>B. If excessive predation is the result of artificial structures or developments (e.g., fences, roads, power lines, landfills, etc.) or if the presence of such structures in proximity to important habitats is suspected to be a problem:</p> <ul style="list-style-type: none"> ▪ LWGs and agency personnel should work closely with utilities, agencies, landowners, and others to document problem areas and develop suitable solutions on a case-by-case basis. ▪ New man-made structures or developments should be designed and sited to minimize effects on sage-grouse populations. ▪ Consider predator control for at risk or isolated populations as a short-term measure. <p>C. If excessive predation is the result of non-indigenous predator species or artificially high predator populations:</p> <ul style="list-style-type: none"> ▪ Where possible, eliminate factors contributing to artificially high predator populations (e.g., unnatural food sources including landfills, dead animal pits, artificial nest substrates, etc.) ▪ Cooperate with Wildlife Services and IDFG in designing and implementing appropriate control measures. Ideally, such efforts should include monitoring that provides comparisons of habitat conditions and predator-species compositions between treatment and control (non-treatment) area(s).

Research, monitoring or evaluation needs: There is a need for additional research, as well as monitoring and evaluation activities to investigate: the behavior of predator species, the intra- and inter-specific relationships of predator populations, the impact of predators and other mortality factors on specific sage-grouse populations of concern, and on sex/age classes. Need to develop better methodologies to assist in identification of predator species linked to sage-grouse predation. Research is needed to determine the factors that affect habitat quality as it relates to the level of predation. Research is needed to determine the effect of habitat fragmentation as it relates to the level of predation. Finally, there is a need to experimentally implement and evaluate predator control measures in areas where predation is suspected to be limiting sage-grouse, to gain a greater understanding of the effects of this management approach on sage-grouse, specific predators, and the relationship between predator species.

4.3.13 Urban/exurban development

4.3.13.1 Threat summary and background

Risk to ecological integrity is generally higher in proximity to areas with dense human population. Higher population densities in proximity to forest and rangeland vegetation types are rated as having higher risk than low population density areas. In contrast, well-managed, viable ranches and livestock grazing allotments can provide habitat and open space needed by sage-grouse and some other wildlife. Road building, camping, hiking, off-road vehicle use, development of recreation sites, and human-caused wildfire are all examples of activities and impacts that tend to increase in wildland areas in close proximity to population centers, with larger population centers having higher activity levels. Ada and Canyon counties meet these criteria as densely populated areas in Idaho. In the Columbia River Basin, 58% of the area is classed as low urban/rural area with approximately 23% as high or very high. Twenty-one percent has high or very high risk of ecological impacts (see Quigley et al. 1996).

Urban areas themselves remove habitat and present inhospitable environments for sage-grouse. However, the connecting roads, power lines and communication corridors, and use of surrounding regions for recreation exert a greater influence on sagebrush habitats (Connelly et al. 2004). In general, urban sprawl impacts sage-grouse to the extent that it infringes on sagebrush communities.

Increased affluence has also resulted in additional uses of lands surrounding cities for development of homes on larger acreages (e.g., ranchettes) (Connelly et al. 2004). Also, within the geographic distribution of sage-grouse, human populations have grown and expanded over the past century, primarily in the western portion of the sagebrush biome (Connelly et al. 2004). In Idaho, the resident population has more than doubled during the past fifty years, increasing from 588,637 to 1,293,594 in 2000 (U.S. Census Bureau statistics).³⁴ Areas surrounding Idaho Falls, Pocatello, and the lower Big Wood River Valley have development expanding into sagebrush habitat. While much of the actual footprint of recent urban/exurban expansion in Idaho is probably occurring outside of SGPA boundaries, in association with communities along I-84/I-15 corridors, for example, the potential for increasing movement into more intact sagebrush communities is very real. Urban/exurban expansion and population growth are closely related to other threats such as infrastructure development, human-caused wildfires, human disturbance, and climate

³⁴ <http://www.census.gov/dmd/www/resapport/states/idaho.pdf>

change, thus the direct and indirect influences of urban/exurban expansion are quite complex and far-reaching.

4.3.13.2 Summary of key conservation issues

Non-urban areas have been developed throughout the sagebrush region because of economic factors combined with opportunities for recreation and other natural amenities (Riebsame et al. 1996, cited in Connelly et al. 2004). In addition, many “exurbanites” have migrated from cities into “ranchettes” created by subdividing larger ranches. While ranchettes may provide some sagebrush habitat as opposed to complete urbanization, such areas are probably rendered unsuitable for sage-grouse due to fragmentation and disturbances associated with new roads, dwellings, and human disturbance (Connelly et al. 2004).

- **Loss of habitat:** Loss of sage-grouse habitat is the primary conservation issue associated with urban/exurban development and can be subdivided into three major categories (1) direct loss of sage-grouse habitat through development of previously occupied habitat for home sites and ranchettes, (2) direct loss of habitat through development of infrastructure to support the above home site developments, and (3) loss of habitat through physical degradation and human activities radiating out from the above developments.

4.3.13.3 Urban/exurban conservation measures

Goal: Protect sagebrush/sage-grouse habitats from losses caused by urban expansion and related human caused impacts.

Issue Addressed	Rationale	Conservation Measure(s)
Direct loss of sagebrush habitat to development of homes and ranchettes	Maintain habitat in what is often critical seasonal habitat areas.	<ol style="list-style-type: none"> 1. Work with county and city zoning and planners to avoid developing important sagebrush habitat. 2. Educate landowners and developers to values of sagebrush habitat. 3. Acquire easements when owners are willing to negotiate conservation agreements. 4. Acquire habitat where there are willing sellers and when it provides the best option to protect and/or restore important habitats: <ol style="list-style-type: none"> A. Identify important parcels of habitat;

Issue Addressed	Rationale	Conservation Measure(s)
		<p>B. Work with landowners to identify willing sellers;</p> <p>C. Use existing funding sources for acquisition.</p> <p>5. Protect wildland areas from wildfire originating on private lands, infrastructure corridors and recreation areas.</p> <p>6. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.</p>
Direct loss of habitat through development of infrastructure to support site development	Maintain maximum amount of suitable habitat in conditions acceptable to sage-grouse and other sagebrush dependent species.	<p>1. Work with county and city zoning and planners to avoid developing important sagebrush habitat.</p> <p>2. Educate landowners and developers to values of sagebrush habitat.</p> <p>3. Acquire easements when owners are willing to negotiate conservation agreements.</p> <p>4. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.</p>
Loss of habitat through physical degradation and human activities radiating out from the above developments	Maintain maximum amount of suitable habitat in conditions acceptable to sage-grouse and other sagebrush dependent species.	<p>1. Work with county and city zoning and planners to avoid developing important sagebrush habitat.</p> <p>2. Educate landowners and developers to values of sagebrush habitat.</p> <p>3. Acquire easements when owners are willing to negotiate conservation agreements.</p>

Research, monitoring or evaluation needs: Parcels of private land suitable as sage-grouse habitat or related habitat values (e.g., potential for restoration) that are susceptible to loss to development or to uses related to new developments need to be identified for potential land exchange, conservation easements or related actions. Identify potential impacts to public lands from human occupancy and related factors (e.g., infrastructure) on adjacent private lands.

4.3.14 Sagebrush control

Due to similarities in management objectives the discussion of sagebrush control was combined with the discussion of prescribed fire presented in Section 4.3.7. This combination is not intended to elevate the threat of sagebrush control to that of prescribed fire, but to clarify the inter-relationships of the techniques to manage sagebrush habitat. Section 4.3.7 contains the presentation of threat summary and background, summary of key conservation issues, and conservation measures, associated with both prescribed fire and other methods of sagebrush control.

4.3.15 Insecticides

4.3.15.1 Threat summary and background

Sage-grouse using agricultural areas for brood-rearing can be exposed to pesticides (Connelly et al. 2000*b*). Organophosphate insecticides, such as dimethoate and methamidophos applied to crops can adversely affect sage-grouse (Blus et al. 1989). In Idaho, 63 out of 200 sage-grouse foraging in alfalfa and potato fields died after exposure to organophosphate insecticides in those fields (Blus et al. 1989). Since sage-grouse often move long distances between seasonal habitats, the total sage-grouse use area influenced by chemicals may be quite large (Connelly et al. 2004). Ingestion of sub-lethal levels of pesticides by birds can result in abnormal or lethargic behavior, increasing risk of predation (see Insecticides, USDI –FWS 2005).

Mormon crickets and native rangeland grasshopper species are a normal component of the biota, and feed on grasses, forbs, and shrubs (USDA APHIS-PPQ 2004*a,b*). Since young sage-grouse hatch in the spring approximately the same time as Mormon cricket and grasshopper populations begin to mature (USDA-APHIS-PPQ 2004*a,b*), and since insects provide a critical source of protein for young grouse, grasshopper and Mormon cricket control efforts have the potential in some cases to impact food availability. Conversely, Mormon cricket and grasshopper infestations may impact herbaceous cover but the impact on sage-grouse has not been quantified. For example, Mormon crickets at a density of 10 per square yard can consume 375 lbs. of dry matter per acre over the course of a four-month lifespan (Cowan 1990 cited in USDA APHIS-PPQ 2004*a*).

Rangeland grasshopper and Mormon cricket control efforts employing malathion, diflubenzuron and/or carbaryl bait reduce grasshopper or Mormon cricket densities in target areas. However, Norelius and Lockwood (1999 cited in USDA-APHIS 2002), suggest that while grasshopper densities can approach 60/m² during outbreaks, treatments that have a 90-95% mortality rate (of grasshoppers) still leave a density of grasshoppers (3-6/m²) that is greater than an average density found on rangelands, such as Wyoming, in a normal year (Schell and Lockwood 1997 cited in USDA-APHIS 2002).

Up to five million acres of federal rangeland in Idaho were anticipated to be infested by Mormon crickets and grasshoppers in 2005 (USDA APHIS-PPQ 2005). The chemical control of grasshoppers or Mormon crickets on Idaho rangelands has the potential to reduce the abundance and/or diversity of non-target insect species utilized by sage-grouse broods in certain areas. However, in sagebrush steppe situations, no more than 50% of treatment blocks receive direct application (USDA APHIS-PPQ

2005). Also, treatment acreages on federal lands have been comparatively low (Table 4-13) (USDA APHIS-PPQ 2005; R. McChesney, USDA APHIS-PPQ personal communication 1/2006). Specific treatment acreage figures for state and private lands are not readily available. However it is likely that, including state, private, and federal lands, less than 2.5% of the area inhabited by crickets and grasshoppers would be treated in a given year, even during outbreaks (R. McChesney USDA APHIS-PPQ personal communication 1/2006).

Table 4-13 Acres of federal Idaho rangelands treated for Mormon crickets and grasshoppers.

Federal Acres Treated in Idaho		
Year	Mormon Crickets	Grasshoppers
2005	68,520	2,394
2004	18,945	2,520
2003	13,585	11,705
2002	340	250
2001	--	420
2000	--	1100

4.3.15.2 Summary of key conservation issues

- **Impacts of agricultural pesticides on sage-grouse:** Sage-grouse adults and broods have been noted to forage in irrigated farm fields. The use of certain insecticides, such as organophosphates, on agricultural crops while sage-grouse were present has resulted in mortality of birds in some cases. Other effects of organophosphates on birds, such as reduced alertness, can increase vulnerability to predation.
- **Impacts of Mormon cricket and rangeland grasshopper control on sage-grouse:** Mormon cricket and grasshopper control has the potential to adversely affect food availability for sage-grouse in certain areas.

4.3.15.3 Insecticide conservation measures

Goal: Reduce the direct and indirect mortality of insecticides on sage-grouse while still providing for adequate control of insects.

Issue Addressed	Rationale	Conservation Measure(s)
Impacts of agricultural pesticides on sage-grouse	Some agricultural chemicals can cause direct or indirect mortality	1. Avoid the use of organophosphates on fields utilized by sage-grouse, or allow for suitable treatment buffers around field edges. Incentive or enhancement payments to offset economic impacts

Issue Addressed	Rationale	Conservation Measure(s)
	of sage-grouse foraging in farm fields.	<p>to farmers may be available through NRCS CSP or other programs. Farmers/landowners are encouraged to discuss options with their local NRCS District Conservationist.</p> <ol style="list-style-type: none"> 2. Work with plant and insect specialists to develop strategies that could be used to protect crops near sage-grouse habitat from insects, thus minimizing the use of insecticides. Planting the outside field borders with certain plants that attract, repel or control insects may be feasible. 3. As alternative brood habitat, manage nearby native habitats, especially moist meadows and riparian areas to be more attractive (e.g. cover, forb availability and diversity) to sage-grouse and broods. 4. LWGs, Cooperative Extension agents, NRCS, IDFG, NAGP and other partners should collaborate to inform farmers of concerns with insecticide use and to develop collaborative solutions to reduce adverse impacts to sage-grouse.
Impacts of Mormon cricket and rangeland grasshopper control on sage-grouse	Mormon cricket and rangeland grasshopper control may reduce food availability for sage-grouse in certain areas.	<ol style="list-style-type: none"> 1. LWGs, land management agencies, landowners, IDFG, IDA, and APHIS-PPQ should continue to collaborate closely to ensure annual control efforts focus on key problem areas, better delineate treatment avoidance areas, determine the treatment of least risk to sage-grouse, and monitor results.

Research, monitoring or evaluation needs: Document mortalities of sage-grouse resulting from pesticide-use to improve our understanding of the extent of this threat. Monitor the impacts of Mormon cricket and rangeland grasshopper control efforts on sage-grouse food (insect) availability in control versus treatment areas. Monitor the effects of Mormon cricket and rangeland grasshopper control with respect to herbaceous and shrub cover in treated and untreated areas.

4.3.16 Agricultural expansion

4.3.16.1 Threat summary and background

Large-scale losses of big sagebrush in Idaho since historical times were largely attributed to increases of agricultural lands, as well as conversion of shrub-steppe vegetation to exotic forbs and annual grass (Wisdom et al. 2000). Prime areas for growing crops (e.g. areas with deeper, fertile soils) were claimed first during settlement (Connelly et al. 2004).

4.3.16.2 Summary of key conservation issues

- **Habitat loss and fragmentation:** Hironaka et al. (1983) estimated that 99% of the basin big sagebrush type (which grow on deeper soils) in the Snake River Plain has been converted to cropland. Nearly one-third of lands in the Upper Snake Ecosystem Reporting Unit (which includes portions of several SGPAs) are described as currently agricultural (Wisdom et al. 2000). Technological improvements in irrigation methods now permit agriculture development on steeper terrain (Connelly et al. 2004).
- **Insecticides:** Chemicals applied to crops can also directly or indirectly affect sage-grouse foraging in farm fields. (See discussion in Insecticides Section 4.3.15.)
- **Predation:** Agricultural development, in addition to direct sage-grouse habitat loss or fragmentation, also influences adjoining sagebrush habitats due to increases in certain predators, such as red fox, ravens, and domestic cats (Vander Haegen and Walker 1999 and Vander Haegen et al. 2002 cited in Connelly et al. 2004). (See discussion in Predation Section 4.3.12.)

4.3.16.3 Agricultural expansion conservation measures

Goal: Manage existing and future agricultural lands in a manner that minimizes or reduces direct and indirect impacts to sage-grouse.
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Issue Addressed	Rationale	Conservation Measure(s)
Habitat loss and fragmentation	Conversion of additional sagebrush lands to agriculture	1. Utilize the Conservation Reserve Program, Wetland Reserve Program, Grasslands Reserve Program, Farmland Protection Program or similar

	may adversely affect sage-grouse.	<p>USDA incentives programs to recover habitat for sage-grouse where feasible.</p> <ol style="list-style-type: none"> 2. Where possible, avoid additional agricultural expansion into key habitat or potential restoration areas. 3. Where there are willing landowners, identify and prioritize parcels available for purchase or exchange that could be restored to perennial grasses, forbs and shrubs. 4. Within LWGs, and with willing landowners, identify options for lands on the Snake River Plain recently withdrawn from irrigation. Options may exist for collaboratively funded restoration projects or development of forage reserves. 5. Where opportunities allow (incentives, partnerships, willing landowner, etc.), off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.
Insecticides	Certain insecticides can cause direct or indirect impacts to sage-grouse	See Insecticides Section 4.3.15.
Predation	Agricultural expansion can increase certain types of predation	See Predation Section 4.3.12.

Research monitoring or evaluation needs: Identify sagebrush communities and potential restoration areas that are susceptible to agricultural development for targeted acquisition, conservation easements or related actions. Document and report sagebrush acreage converted to agriculture at periodic intervals (to be determined) by county.

4.3.17 Sport hunting

4.3.17.1 Threat summary and background

Controversy over the impacts of sage-grouse hunting dates to the early part of the 20th century (Hornaday 1916). Sage-grouse hunting has been a tradition in Idaho for many generations and many families spent opening weekend camped in sage-grouse country. During the early 1980s over 30,000 hunters pursued sage-grouse every year. Early research suggested that hunting had little impact on sage-grouse populations (June 1963, Crawford 1982, Braun and Beck 1985). Wallestad (1975) reported that despite fluctuating population trends, Montana maintained liberal sage-grouse seasons because of high annual turnover, “law of diminishing returns,” and “opening day phenomena.” Harvest was generally thought to be a compensatory form of mortality (the proportion of the population that was harvested would die from some other factor if hunting did not occur). However, recent research has suggested that sage-grouse may be more susceptible to over-harvest than other upland game bird species because they have population characteristics that include relatively low reproductive rates, long lives, low annual turn-over, and high over-winter survival (Schroeder et al. 1999).

Autenrieth (1981) and Crawford and Lutz (1985) suggested that hunting may have negative effects on sage-grouse populations. Johnson and Braun (1999) concluded that up to some threshold level, hunting mortality was compensatory, but at or beyond that level, exploitation of sage-grouse may be additive (the number shot adds to those that die from other causes). Recent research in California, Nevada, and Wyoming also provided evidence indicating that hunting at some level may impact subsequent breeding populations (Connelly et al. 2004). Connelly et al. (2000a, 2003a) concluded that hunting can slow the rate of increase for sage-grouse populations and that harvest losses are likely additive to winter mortality and may result in lower breeding populations. However, a reported direct recovery rate of 7-10% of banded birds in North Park, Colorado, occurred from 1973 to 1990, a period when the number of displaying males counted increased from about 580 to over 1,500 (Zablan et al. 2003).

A more complete review of the impacts of hunting on sage-grouse is provided in Connelly et al. (2004). See also Connelly et al. (2005) for a comprehensive overview of historical and current thinking with respect to harvest management.

In 1953 when the first sage-grouse harvest estimates were developed for Idaho, season regulations were very conservative, as they were for most upland game species in Idaho. This approach reflected uncertainty over the impacts of bag limits

and season lengths on hunter harvest and participation. From 1953 through 1989, seasons varied from 1-14 days, and the estimated annual statewide harvest averaged 40,000 to 50,000 sage-grouse. From 1990 to 1995, the season was 30 days long statewide with an estimated annual harvest of about 25,000 sage-grouse. From 1996 to 2001, season frameworks varied across the state and estimated annual harvest declined to under 10,000 birds. From 2002-2004, seasons remained conservative relative to historic levels and estimated annual harvest averaged about 7,800 birds.

Methods used to estimate harvest varied from 1953 to 1999, and included a voluntary mail survey until 1983, and a telephone survey from 1983 to 1999. The sample size of hunters surveyed and accuracy of these two methods varied as survey budgets expanded and contracted. Since 2000, a special permit has been required to hunt sage-grouse and sharp-tailed grouse. This permit system has allowed for more efficient identification and sampling of Idaho sage-grouse hunters and provides more precise harvest estimates. The Department now interviews about 30% of the total number of permit-holders annually to develop harvest estimates. For example, IDFG interviewed 2,010 (27%) of the estimated 7,382 sage-grouse hunters in 2004.

Based on the annual permit-holder survey, since 2000 the estimated annual harvest of sage-grouse has averaged about 7,800 birds taken by about 6,000 hunters. This is less than 25% of the hunter and harvest estimates made before 1996. The apparent decline in hunter participation probably reflects more restrictive seasons and perceptions of lower sage-grouse populations. These two factors may have reduced interest in sage-grouse hunting although sage-grouse numbers have generally increased in Idaho since 1996. The opportunity to hunt sage-grouse provides population and distribution data (e.g., wing barrels and hunter interviews). In addition, interest in hunting contributes to support for sage-grouse conservation and maintains an Idaho tradition.

In 2004, sage-grouse hunter check stations were conducted on opening weekend at 16 locations throughout southern Idaho (Figure 4-16). Wings collected at check stations and wing barrels placed at 27 sites across the state provide information on the age and sex composition of harvested birds. Using these methods, over 3,000 hunters were interviewed at check stations in 2004 to document hunter activities and about 2,000 wings were collected and aged to document production.

Idaho Sage-grouse Check Station and Wing Barrel Locations

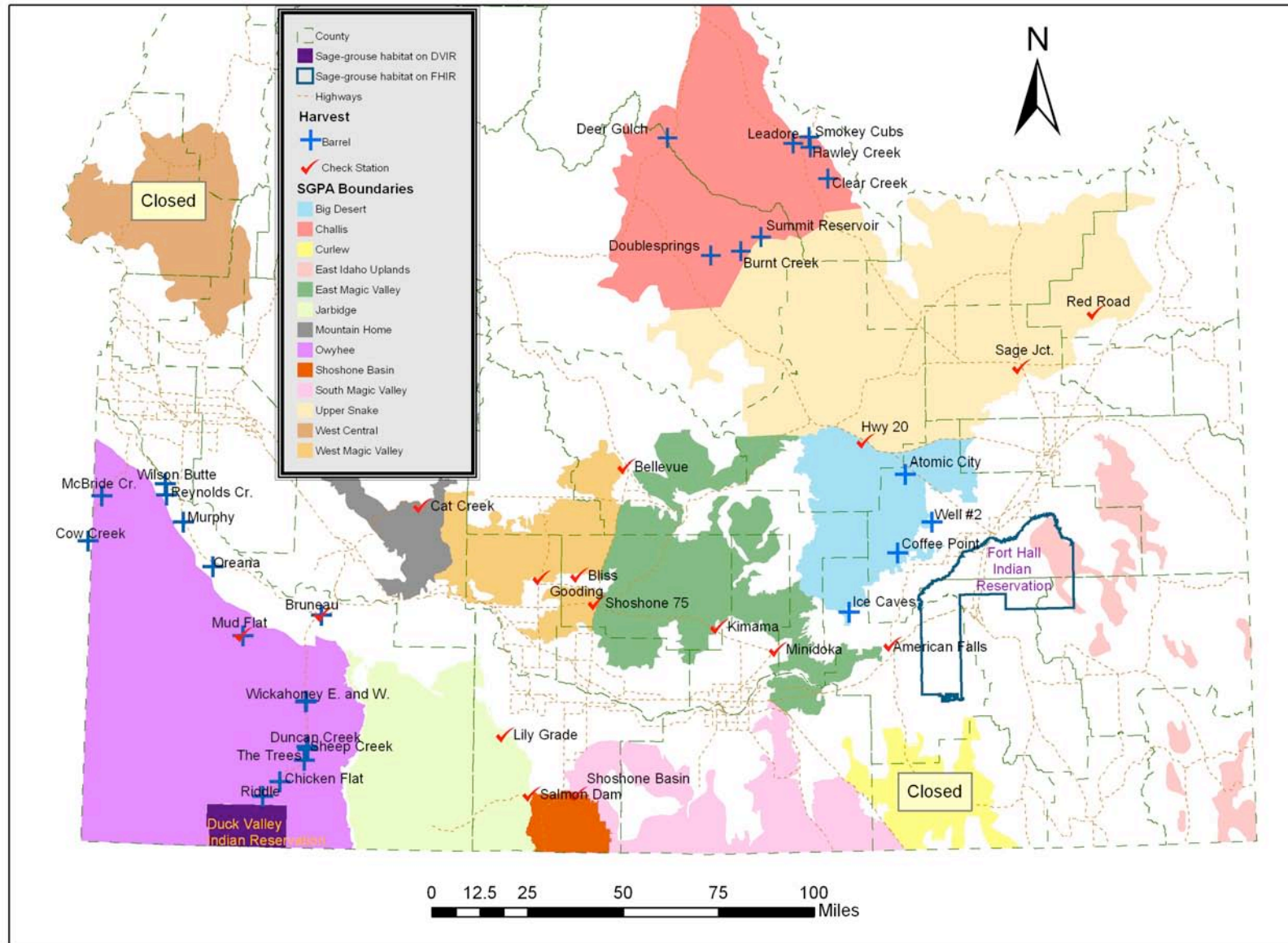


Figure 4-16 Sage-grouse wing barrel and check station locations

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Data from wing barrels in the Southwest Region indicate that in an area with a 23-day season, 55% of the total wings (n=665) are collected during opening weekend, 24% the second weekend, 17% the third weekend, and 4% the fourth weekend (2004 data).

Because of concerns over the effect of harvest on sage-grouse, IDFG biologists are actively evaluating the effects of hunting on Idaho sage-grouse. Existing data support the conclusion that the current Idaho sage-grouse season structure is well within suggested hunting guidelines (Connelly et al. 2000b, Wambolt et al. 2002).

4.3.17.1.1 Falconry

For the purposes of this Plan the discussion of falconry has been combined with hunting. Falconers consider sage-grouse to be one of the most difficult prey species to catch and consider them a trophy. In 2003, Idaho had 73 licensed falconers of which approximately 15 hunted sage-grouse. Only seven or fewer falconers are believed to hunt sage-grouse more than seven days per year. During the 1980s, IDFG conducted an annual harvest survey of falconers. Because of the small take of quarry by falconry methods, this survey was deemed unnecessary and subsequently discontinued. Based on the small number of falconers that pursue sage-grouse in Idaho, the annual take is believed to be fewer than 100 grouse statewide.

Another potential issue associated with falconry is the possible disturbance of lekking grouse in March. In 1995 at the suggestion of the Idaho Falconers Association, the falconry season for upland game birds, including sage-grouse, was shortened by two weeks to March 15 to minimize any disturbance to sage-grouse near leks. Most sage-grouse breeding occurs after that date. Hunting winter flocks of grouse has not been considered a problem since sage-grouse survival during winter is typically high, and low numbers of falconers pursue the species. If sage-grouse numbers demonstrate a significant decline, the falconry pursuit of the species will need to be readdressed. Removing falconry hunting during the winter season would be the first obvious action. Under current regulations, if areas are closed to firearms hunting, the falconry season is also closed.

4.3.17.2 Summary of key conservation issues

- **Need for better hunter effort and success information:** While current Idaho sage-grouse seasons and bag-limits are generally conservative, there is some uncertainty about the timing and impacts of hunter harvest especially on smaller or isolated populations.

- **Need for juvenile production data:** While wing barrels and hunter check stations are currently operated in many strategic locations, not all hunters encounter check stations or barrels and check stations are generally run only during opening weekend. A higher proportion of wings need to be collected and existing wing data are in need of more careful analysis.
- **Need for season and harvest criteria:** As mentioned previously, current seasons and bag-limits for sage-grouse are conservative, but establishing uniform criteria or “triggers” for change will help ensure consistency in approach across the state.

4.3.17.2.1 Hunting season and bag-limit guidelines

Table 4-14 outlines hunting season and bag-limit guidelines, these are referenced in the following conservation measures.

Table 4-14 Hunting season and bag-limit guidelines for sage-grouse populations

Option	3-year running average of lek counts	Days	Daily Bag
Closed	<ul style="list-style-type: none"> • Less than 100 males observed • Lek counts are less than 50% of 1996-2000 average counts • Lek data not gathered for population 	0	0
Restrictive	<ul style="list-style-type: none"> • Lek counts are between 50% and 150% of the 1996-2000 average. 	7	1
Standard	<ul style="list-style-type: none"> • Lek counts exceed 150% of the 1996-2000 average. 	23	2

4.3.17.3 Sport hunting conservation measures

Goal: Manage hunting to support the increase of sage-grouse populations in Idaho and for the sustainability of smaller, more isolated populations that may be more vulnerable to overharvest.

Issue Addressed	Rationale	Conservation Measure(s)
Need for better hunter effort and success information	To ensure seasons and bag-limits are set using the best-available information and are consistent with ensuring sustainability of sage-grouse	<ol style="list-style-type: none"> 1. Require a special permit to hunt sage-grouse in Idaho to allow for efficient identification and sampling of sage-grouse hunters. 2. Conduct an annual telephone survey in order to contact adequate numbers of sage-grouse hunters to allow for reliable statewide and local harvest estimates.

Issue Addressed	Rationale	Conservation Measure(s)
	populations in Idaho.	<ol style="list-style-type: none"> 3. Evaluate accuracy of current harvest estimate data and implement needed changes. 4. Consider the feasibility and potential value of implementing a permit system with mandatory reporting by all hunters.
Need for juvenile production data.	Juvenile production data are crucial to sage-grouse management and wing collection from hunters is currently the only feasible way to collect these data.	<ol style="list-style-type: none"> 1. Conduct opening weekend hunter check stations at strategic locations statewide (Figure 4-16) to collect harvest information and wings from harvested birds. 2. Place wing barrels at strategic locations to increase the sample of wings from harvested birds. 3. Send voluntary wing envelopes to some Idaho sage-grouse hunters before the hunting season to test whether voluntary return of wings can increase the proportion of wings collected from harvested birds. 4. Annually analyze all sage-grouse wings collected to determine age, sex, and molt pattern of harvested birds. 5. Analyze existing wing data to determine the differences in sex and age of the harvest during the opening weekend, compared to later in the season, and summarize other long-term trends.
Need for season and harvest criteria.	Uniform criteria will ensure seasons and bag-limits are established using a consistent process.	<ol style="list-style-type: none"> 1. Identify sage-grouse populations where overharvest is a risk because of (1) isolated or fragmented habitat, or (2) small numbers of birds. Develop appropriate 2006 hunting season recommendations to reduce risk. 2. The following guidelines should be considered by the Idaho Fish and Game Department when making sage-grouse season recommendations to the Idaho Fish and Game Commission: <ol style="list-style-type: none"> A. Do not hunt populations where less than 300 birds comprise the breeding population (100 or less males counted on leks). All populations geographically isolated by more than 15 miles will be considered separate populations unless specific data demonstrate otherwise. B. Restrict the hunting season if data indicate harvest of over 10% of the fall population for more than one year.

Issue Addressed	Rationale	Conservation Measure(s)
		<p>C. Use the criteria identified in Table 4-14 when setting hunting seasons for each population. LWGs should evaluate how well these guidelines apply to their areas and provide recommendations to the IDFG by May 1, of each year.</p>

Research, monitoring or evaluation needs: Complete geographic delineation of sage-grouse populations. Conduct monitoring activities to refine understanding of harvest effects on populations, age, and sex-classes. Monitor impact of spring hunting on leks.

4.3.18 Mines, landfills, and gravel pits

4.3.18.1 Threat summary and background

Surface mining of any mineral resource, including gravel, will result in direct habitat loss for sage-grouse if the mining occurs in occupied sagebrush habitats (USDI-FWS 2005). Broad-scale graphics prepared by Connelly et al. (2004) indicate a clustering of landfills associated with the East, West, and South Magic Valley; Upper Snake; and Challis SGPAs. The extent and distribution of mines and gravel pits was neither quantified nor mapped for this plan due to limited available information. LWGs are encouraged to do so in the development of their plans, to the extent that these factors are of concern locally.

4.3.18.2 Summary of key conservation issues

- **Habitat loss:** Mines, landfills, and gravel pits, by their nature, result in direct habitat loss and fragmentation. Indirect effects, such as establishment of invasive plants may occur in disturbed areas.
- **Disturbance to important seasonal habitats:** Human activity and noise associated with machinery or heavy equipment in proximity to occupied leks or other important seasonal habitats may disturb sage-grouse.
- **Predation:** Landfills can potentially facilitate predator and corvid (crows, ravens, and related) movements (Connelly et al. 2004). Infrastructure associated with mines or landfills may also facilitate avian predation (See Predation Section 4.3.12 and Infrastructure Section 4.3.2 for additional discussion).

4.3.18.3 Mines, landfills, and gravel pits, conservation measure

Goal: Design and operate mines, landfills and gravel pits in a manner that minimizes or reduces habitat loss or disturbance to sage-grouse.

Issue Addressed	Rationale	Conservation Measure(s)
Habitat loss	The footprint associated with mines, gravel pits and landfills results in habitat loss until such	1. Discourage the establishment of new mines, landfills or gravel pits within sage-grouse breeding or winter habitat. Where possible, avoid occupied leks by at least 3.2 km (2 miles) (adopted from Connelly et al. 2006, and Stinson et al. 2004).

Issue Addressed	Rationale	Conservation Measure(s)
	areas are suitably rehabilitated.	<ol style="list-style-type: none"> 2. If the placement of new mines, gravel pits, and landfills in or near breeding habitat is unavoidable, ensure that reclamation plans incorporate the appropriate seed mix and seeding technology to restore suitable breeding habitat characteristics. 3. During activities associated with the exploration, operation, and maintenance of mines, gravel pits, or landfills, ensure that adequate measures are implemented to control invasive plant species. 4. Ensure adequate weed control measures are implemented during the life of the operation. 5. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.
Disturbance to important seasonal habitats	Activity associated with mines, gravel pits and landfills have the potential to disturb sage-grouse.	<ol style="list-style-type: none"> 1. Apply seasonal-use restrictions (see Human Disturbance Section 4.3.5.) on activities associated with the exploration, operations, and maintenance of mines, gravel pits, or landfills, including those associated with supporting infrastructure.
Predation	Landfills have been associated with increased presence of corvids	See Predation Section 4.3.12.

Research, monitoring or evaluation needs: Improve upon and standardize disturbance buffers. Monitor the effectiveness of recommended disturbance buffers.

4.3.19 Falconry

4.3.19.1 Threat summary and background

The discussion of falconry was combined with hunting in Section 4.3.17. No unique falconry conservation measures were identified.